

THE MEDICAL NEWS.

A WEEKLY JOURNAL OF MEDICAL SCIENCE.

VOL. LIV.

SATURDAY, MARCH 9, 1889.

NO. 10.

ORIGINAL LECTURES.

HUNTING YELLOW FEVER GERMS.

An Address delivered by special invitation before the Quarantine Conference, at Montgomery, Ala., March 5, 1889.

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GENTLEMEN: It would have been far more satisfactory to you and to me if the subject of my address this evening could have been announced as "The Yellow Fever Germ." I need hardly say that nothing would have given me greater pleasure than, in the presence of the experts in the clinical and prophylactic management of yellow fever here assembled, to exhibit microscopic preparations and pure cultures of the specific infectious agent which I have been so long in search of. I shall show you presently upon the screen photo-micrographs of a variety of microorganisms which I have encountered in the course of my researches, some of which are hitherto undescribed species, and among them some which have specially engaged my attention as possible yellow fever germs. I shall also show you cultures and photo-micrographs of the micrococcus presented to me by Dr. Domingos Friere, of Brazil, as his microbe of yellow fever; of the tetragenus febris flavæ of Dr. Carlos Finlay, of Havana; and of the bacillus of Dr. Paul Gibier, of Paris.

But I must announce to you, in advance, that there is no satisfactory evidence that any one of these microorganisms is the veritable infectious agent in the disease under consideration.

I at first hesitated to accept the invitation extended to me to address you on this occasion, inasmuch as my investigations have not yet led to any definite result, and as they are still in progress and will be continued in Havana during the present summer. But the importance of the occasion and the solicitation of my good friend Dr. Cochran, the efficient Health Officer of the State of Alabama, have induced me to come here for the purpose of making a brief statement relating to the present status of the investigation with which I am charged, and especially for the purpose of demonstrating to you the methods of research employed by bacteriologists in investigations of this nature.

I may say before going any further, that my faith in a living infectious agent as the specific cause of this disease is by no means diminished by my failure thus far to demonstrate the exact form and nature of this hypothetical "germ." The present state of knowledge with reference to the etiology of infectious diseases in general, and well-known facts relating to the origin and spread of yellow fever epidemics, fully justify such a belief. The *a priori* grounds for such faith I stated as long ago as 1873, in a paper published in *The American Journal of the Medical Sciences* (July, 1873); and the progress of knowledge since that date has all been in the direction of supporting this *a priori* reasoning. But yellow fever

is by no means the only infectious disease in which satisfactory evidence of the existence of a living infectious agent is still wanting. In the eruptive fevers generally no demonstration has been made of the specific etiological agent—at least none which has been accepted by competent pathologists and bacteriologists. Again, in the infectious disease of cattle known as pleuropneumonia, notwithstanding very extended researches by competent investigators in various parts of the world, no satisfactory demonstration of the germ has been made. The same is true of hydrophobia, in which disease we are able to say with confidence the infectious agent is present in the brain and spinal cord of animals which succumb to rabies; this infectious agent is destroyed by a temperature which is fatal to known pathogenic microorganisms (65° C.), and by various germicide agents, yet all efforts to cultivate it or to demonstrate its presence in the infectious material by staining processes and microscopical examination have thus far been unsuccessful.

You are aware that my first effort to solve the etiology of yellow fever was made ten years ago. As a member of the Havana Yellow Fever Commission of the National Board of Health, I had an opportunity to make researches which, in advance of the effort, I fondly hoped might lead to demonstration alike creditable to American science and useful as a basis for preventive and curative measures in this pestilential malady, which has destroyed the lives of so many of our fellow-citizens, and has so largely interfered with the material progress of certain sections of the United States. I knew, from personal experience, the malignant nature of the disease, and the futility of the various modes of treatment which had been resorted to in the effort to combat it. It was, therefore, with the deepest interest as well as with strong hopes of success, that I went to an endemic focus of the disease to search for the yellow fever germ. The recent (1873) demonstration of the spirillum of relapsing fever in the blood of patients suffering from this disease, and the recognized facts relating to the etiology of anthrax, considered in connection with the current notions relating to the pathology of yellow fever, led me to hope that the discovery would prove an easy one. I was familiar with the most approved methods of mounting and staining microorganisms, and was provided with the best high-power objectives that could be procured, the one-twelfth and one-eighteenth homogeneous oil immersion objectives of Karl Zeiss, of Jena, Germany. Not only did I feel that I was equipped for the recognition of any microorganism which might prove to be present in the blood, but I was prepared to photograph it, and thus to show to others what I might see in blood drawn from the circulation of yellow fever patients. You know the result of this investigation; "ninety-eight specimens from forty-one undoubted cases of yellow fever were carefully studied, and one hundred and five photographic negatives were made, which showed satisfactorily everything

demonstrable by the microscope." But no microorganism was discovered. I shall presently show you upon the screen a photo-micrograph of yellow fever blood, made in Havana at the time mentioned, so that you may judge of the performance of my Zeiss one-eighteenth inch objective, and have ocular evidence that no microorganism demonstrable by this magnificent lens was present in it. I may say here that my culture experiments, made in Havana last spring, in which blood taken from one of the cavities of the heart, as soon as possible after death, was introduced into various nutritive media, gave a like negative result.

Out of ten cases in which I made autopsies, in the military hospital at Havana, a development of microorganisms occurred in two only. In the exceptional cases I obtained a bacillus which subsequent researches showed to be identical with a bacillus constantly found in the alimentary canal of healthy persons—the *bacterium coli commune* of Escherich.

The absence of microorganisms from blood drawn from the finger during life, or from the heart after death, cannot, however, be accepted as evidence that there are no parasitic organisms anywhere in the tissues. The bacillus of typhoid fever, for example, is rarely found in the circulating fluid, although it must be transported in the blood current to the various organs in which foci of growth are found which contain numerous bacilli. Such foci are especially abundant in the spleen, but even in this organ many thin sections may be made before a single focus of development is encountered.

Having failed to find the yellow fever germ in the blood, we may still admit that, as in typhoid, it is perhaps only to be found in the organs principally involved in the morbid process. This reasoning has led me to give special attention to an examination of the liver and kidney, both by the culture method and by the examination of thin sections. Both methods have given me positive results, so far as the occasional presence of microorganisms is concerned, but both are in accord in failing to demonstrate the constant presence of any particular organism. In my culture experiments, made in Havana last year, the microorganism most frequently encountered was my bacillus *a*, already referred to as found in two out of ten cases in cultures from blood drawn from the heart. Naturally, I have given much attention to this bacillus, and it was only after an extended series of comparative experiments that I gave up the hope that it might be concerned in the etiology of the disease under consideration. These comparative experiments forced me to the conclusion that this is the same bacillus as was found by Emmerich in cholera cadavers at Naples, and that it corresponds with the *bacterium coli commune* of Escherich.

In my researches by the method of staining thin sections of the tissues hardened in alcohol, I have encountered several different microorganisms; but no one of these has been found in a series of cases. One, the bacillus of Lacerda and Babes, I have found only in material brought from Dr. Lacerda's laboratory in Brazil, and in two only out of nine cases represented by material from this source. In one of my Havana cases, in which the material was collected by my friend, Dr. Burgess, in 1887, a long bacillus was found in the kidney, for the most part in the glomeruli. In a case in which I made the autopsy in Havana last spring a

micrococcus, grouped in fours, was found in the kidney.

Evidently, if any one of these microorganisms was found in a considerable series of cases, the fact would be decidedly significant, and would afford presumptive evidence that the parasitic organism found bore some relation to the morbid process. But, even if one and the same microorganism was found in every case, the final proof of its etiological import would depend upon its isolation in pure cultures, and the production of the characteristic phenomena of the disease in one of the lower animals, or, in the absence of a susceptible animal, in man himself.

The method of cultivation is by far the most reliable for the demonstration of microorganisms which will grow in our culture media, for isolated cocci or bacilli might easily escape observation when present in small numbers but would serve to start a culture. Thus the bacillus of typhoid fever, which, as stated, is not as a rule found in the blood of the general circulation, and is only found in the spleen in scattered clumps, may be obtained from this organ in pure cultures, almost without fail, by introducing a small quantity of splenic pulp into a suitable nutritive medium.

Moreover, this method enables us to differentiate microorganisms which look alike, and which by microscopic examination alone it would be impossible to distinguish one from another. This is a fact now well recognized by bacteriologists, but not generally appreciated by microscopists whose researches have been limited to the staining and mounting of sections.

Both methods require skill and practice in the execution and great caution in drawing conclusions, for there are a thousand traps lying in wait for the explorer, in this field of investigation. It is for this reason that pseudo-discoveries are so numerous.

Especial care is required in the microscopical examination of stained preparations of yellow fever tissues. One encounters in the urinary tubules, mingled with the debris of the desquamated epithelium, stained masses of various forms which often closely resemble cocci or bacilli. These I believe to be fragments of nuclear material. The same material is often massed in the urinary tubules in the form of plugs, which are deeply stained by the aniline dyes.

Again, fragmentation of the nuclei of cells still in position may give the impression of a cell containing cocci; and the karyokinetic figures found in the cells, especially in the liver, often resemble bacilli so closely that it is difficult to convince any one not familiar with them that they are not microorganisms.

The "plasma cells" of Ehrlich, also, seem to have as their chief function the rôle of deluding amateur microscopists into the idea that they have made a discovery. They are often very abundant in the liver and in the kidney of yellow fever cases, and so closely resemble zoöglæa masses of micrococci that experienced pathologists have been deceived by them.

In addition to these objects which resemble microorganisms there are dangers from the post-mortem invasion of the tissues when the autopsy has been delayed beyond an hour or two, in the warm climates where yellow fever prevails; or even in the preserving medium, or during the process of staining.

My experiments made in 1883 showed that "exposure

to ninety-five per cent. alcohol for forty-eight hours did not kill the bacteria in broken-down beef-tea (old stock)," and pathologists are familiar with the picture presented by the post-mortem invasion of tissues which have been left in alcohol which was not strong enough to preserve them.

Finally, inasmuch as my culture experiments with material collected soon after death, from the liver and kidney, gave a positive result in a certain proportion of the cases, it is evident that the microorganism most frequently found by this method—my bacillus *a*—should occasionally be encountered in stained preparations.

The possibility remains that by some method of staining not hitherto employed, the specific infectious agent may yet be demonstrated in the tissues; but the fact that my culture experiments with material from the liver and kidney of ten cases failed to demonstrate any such specific microbe is opposed to this view. We may, of course, suppose that the yellow fever germ not only requires special methods, yet undiscovered, for its demonstration in the tissues, but that it will not grow in the culture media which I have employed in my researches. I would say in reply to this hypothesis that all known pathogenic microorganisms may be demonstrated by the staining methods employed, and that, inasmuch as the yellow fever germ appears to find a favorable nidus in filth beds external to the body, I have been inclined to believe that, like the bacillus of typhoid fever and cholera, it is not especially nice as to the character of the medium in which it may develop. However, this may be a mistaken idea, and I propose in my future researches to make use of various culture media not yet employed, and especially to make cultures from the tissues and the excreta in an atmosphere from which oxygen has been excluded; for it may be that, like the bacillus of malignant oedema and the bacillus of tetanus, the yellow fever microbe is anaërobic.

While, then, I admit that by some special method of staining, or by a modification of the culture methods heretofore employed, the specific infectious agent we are in search of, may yet be found in the tissues of yellow fever patients, I feel justified in saying that no such demonstration has yet been made. The negative results attending my researches in this direction have led me to turn my attention to the microorganisms present in the alimentary canal, for the possibility suggests itself that this may be after all the habitat of the deadly yellow fever microbe, which is capable of destroying life within two or three days, and that the phenomena of the disease are not directly due to its presence in the body, but result from the absorption of a poisonous ptomaine produced by it, as appears to be the case in cholera.

The famous English hygienist Parkes, from the consideration of evidence relating to the prevalence of yellow fever during a series of years among English troops stationed in Jamaica and elsewhere within the "yellow fever zone," in connection with the sanitary condition of their barracks, arrived at the conclusion that yellow fever is a "fecal disease," and there are many facts relating to the origin and extension of epidemics which seem to support this view—that is, the belief that the germ finds a proper nidus in fecal matter external to the body. If in yellow fever, as in cholera, the infectious agent is located in the alimentary canal of those who fall sick with the disease, we can readily understand how

it is that new centres of infection are developed, when external conditions are favorable, in the localities where imported cases have occurred, or as a result of the introduction to such localities of fomites.

This view also accords with the demonstrated fact that yellow fever is not directly communicated by the sick to those in attendance upon them. Pathogenic germs which multiply in the intestine no more endanger those who are associated with the infected individual than the same microorganisms cultivated in a suitable medium in a test tube endanger the bacteriologist who is engaged in their study.

The possibility that the infectious agent in yellow fever may have its habitat in the alimentary canal, occurred to me several years ago, and I determined, in advance of my visit to Havana last spring, to give special attention to a bacteriological study of the intestinal contents.

It is well known that the excreta of healthy persons contain a vast number of microorganisms of various species, and that while some of these appear to be constant, others are occasional, and, we may say, accidental tenants of the human intestine, being introduced, no doubt, with the ingesta, and especially in drinking water.

Notwithstanding the researches of Brieger, of Biennstock, of Escherich, of Vignal, and others, this bacterial flora of the healthy intestine is still imperfectly known. The attempt, therefore, to explore this field for the purpose of finding a specific microbe in any particular disease, is attended with very great difficulties, unless, as in cholera, this specific microbe occupies the field to the exclusion of the ordinary bacteria found in the intestinal contents. Koch found his "comma-bacillus" almost in pure cultures in the characteristic rice-water discharges of cholera patients, and other bacteriologists, following his methods, have had no difficulty in verifying the presence of the same microorganism in cases of cholera occurring in various parts of the world. On the other hand, extended comparative researches, including my own investigations made in Havana and in Decatur, show that the "comma-bacillus," or rather spirillum, is not found in the alvine discharges of healthy persons, or in other diseases than cholera. If in yellow fever, as in cholera, there was a microorganism in pure cultures, or in relatively great abundance, capable of growing in the culture media which are suitable for the development of a majority of the known pathogenic organisms, I ought to be able, to-night, to exhibit to you cultures and photomicrographs of this microorganism. But my researches show that the microorganism which is by far the most abundant, and, so far as my investigations go, the only constant form found in the excreta of yellow fever cases, is the *bacterium coli commune* of Escherich, which is also the most constant and abundant form found in the excreta of healthy persons.

In Havana my cultures were made from material from the stomach and intestine of fatal cases obtained at the time of making the autopsy. My researches did not show that any of the microorganisms encountered was constantly present, with the exception of the *bacterium coli commune*—my bacillus *a*. Having excluded this bacillus by comparative researches, there was nothing to point to any one of the microorganisms present in my cultures as the probable infectious agent I was in search of.

The bacillus of Dr. Paul Gibier I only encountered in three cases out of ten, and in these it was not present in

very great abundance, compared with the colon-bacillus for example.

My time in Havana, limited by my orders, was too brief to enable me to make an exhaustive research. The epidemic in Florida and Alabama during the past summer gave me an opportunity to continue the investigation, and, at my request, I was directed to proceed to the infected district for this purpose. The presence of my friend Dr. Jerome Cochran, State Health Officer, at Decatur, decided me to locate my laboratory in that place, where I found abundant material for the researches I had in view. Having made a considerable number of autopsies in Havana, I determined while in Decatur to devote my attention especially to a bacteriological study of the alvine discharges collected during the different stages of the disease.

Evidently, if the infectious agent multiplies in the intestine, it should be found in the excreta during the earlier stages of the attack.

The cause must be present in advance of the development of the morbid phenomena which characterize the disease. But it is quite possible that during its later stages the etiological agent has perished, and, therefore, would not appear in cultures made from material obtained post-mortem.

While in Decatur, and after my return to Baltimore, I examined by bacteriological methods—Esmarch tubes—the excreta of 39 cases of yellow fever, and for comparison of 9 convalescents and of 19 healthy individuals. A detailed account of the results reached will be given in my final report. As was to have been expected, I have encountered a variety of microorganism. Many of these I have isolated in pure cultures, and the biological and pathogenic characters of several have been carefully studied by cultivation in various media and by inoculation experiments in the lower animals. It would be premature for me to attempt to give you the results of these researches even if time permitted me to do so. But I may repeat what I said at the outset that the germ of yellow fever has not yet been demonstrated. It is possible, however, that one or the other of the microorganisms which I have isolated is the long-sought germ, although I have no satisfactory evidence upon which to base a claim that this is the case.

My attention has been especially directed to the liquefying organisms found in the excreta of the 39 cases examined. In a majority of these cases the presence of liquefying bacilli was demonstrated, but liquefying colonies were not numerous as compared with the non-liquefying, among which the colon-bacillus of Escherich was by far the most abundant. In a series of Esmarch tubes No. 1 would show numerous liquefying centres, usually within twenty-four hours, very often No. 2 would contain a few liquefying colonies, while, as a rule, No. 3, although containing numerous isolated colonies of the colon-bacillus, did not contain any liquefying colonies. Further, I found that several different liquefying organisms were present in different cases, or were associated in the same case. I shall presently show you cultures and photomicrographs of these liquefying bacilli. The one most frequently present, my bacillus *o*, I have since found in cultures from another source, and am obliged to exclude it as the possible specific etiological agent of yellow fever. It has also been isolated by Dr. Booker, of Baltimore, from the discharges of one or more infants suffering from

summer diarrhoea. The bacillus of Gibier I have only isolated from three cases, and in these it was not present in considerable numbers. I have made extensive experiments upon the lower animals, which show that this bacillus has interesting pathogenic properties, but give no special support to the view that it is the specific germ of yellow fever. I have never observed in my cultures the black pigment which, according to Gibier, is produced during the development of this bacillus, and am at a loss to understand this discrepancy in our observations.

So far as the pigment in black vomit is concerned, I have no doubt that it is of hæmic origin. I have never failed to demonstrate, by a microscopic examination, the abundant presence of red blood-corpuscles in the numerous specimens of black vomit which I have examined. The little black flocculi are, in fact, made up of agglomerated corpuscles which have lost their pigment and appear as pale disks, often more or less swollen and distorted; while the brownish pigment, which has been changed by the acid secretions of the stomach, remains in their vicinity in the form of granules or amorphous masses. The idea that there is something specific about this pigment, or that it is the secretion of a specific microbe, as has been maintained by Freire and by Gibier, appears to me to be untenable. In a majority of the non-fatal cases of yellow fever and in a certain proportion of the fatal cases there is no passive hemorrhage into the stomach, and consequently no black vomit, yet these cases must result from the action of the same etiological agent as those in which this symptom is present.

I have found by experiment that the bacillus of Gibier, the micrococcus of Freire, and the tetragenus of Finlay, all grow after being exposed for an hour to a temperature of -15°C . (5°F). Exposure outside of the laboratory in Baltimore for five days in the month of January failed also to destroy the vitality of these microorganisms, although the temperature, during the greater part of the time at least, was below the freezing-point.

Having thus given you a brief account of the present status of the investigation in which I am engaged I propose to devote the remainder of the time at my disposal to a practical demonstration of the methods of research employed, and to an exhibition upon the screen of the various microorganisms to which I have referred.

ACUTE PANCREATITIS.

A Consideration of Pancreatic Hemorrhage, Hemorrhagic, Suppurative, and Gangrenous Pancreatitis, and of Disseminated Fat-necrosis.

The Middleton-Goldsmith Lecture for 1889, delivered before the New York Pathological Society, Feb. 16, 1889.

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SUPPURATIVE PANCREATITIS.

In order to more fully appreciate the relation which hemorrhagic pancreatitis may bear to pancreatic inflammation and hemorrhage, it becomes necessary to consider the evidence in favor of other varieties of acute pancreatitis. Although the authorities of the present

day make but little mention of a suppurative inflammation, Lieutaud¹ in the last century alludes to cases of pancreatic abscess reported by Bartholinus, Tulpus, Aubert, and Patin.

To these may be added those of Riolanus, Bons, and Gautier, referred to by Ancelet.² Clässen³ states that Blanchard, in 1688, described the occurrence of small, purulent points on the surface of the pancreas of a child who died of smallpox. Also that Tonnellé found a suppurating pancreas in two cases of puerperal fever. But the cases thus referred to are almost invariably of but little value for purposes of comparison. Döring,⁴ for instance, found the enlarged and indurated pancreas connected with an abscess in the mesentery of the transverse colon, which held some four ounces of offensive, yellow pus, apparently proceeding from the pancreas. But the evidence is wanting to show that the pancreas was the source of the disease.

Portal⁵ saw the pancreas soaked in pus in the body of a man who died after a violent attack (of gout?). Again,⁶ he found the contents of the abscess often enclosed, as in a pocket, in a membranous sac formed by the cellular tissue which covers the pancreas. He declares that he has seen more than a quart (*deux livres*) thus enclosed. Here again the question may be raised as to the nature of the abscess and its relation to the pancreas. His mention⁷ is worthy of note, of the man who died after extirpation of the testicle and ligature of the spermatic cord. A large quantity of pus was found in the cord, and a considerable abscess around the pancreas.

It is supplemented by the case reported by Moore,⁸ of a young man who was seized with a sudden, abdominal pain which in the course of twenty-four hours became worse, and fixed in the right iliac fossa. There were vomiting, constipation, and chills. For several days the patient was not confined to his bed, but he died on the nineteenth day. The diagnosis was typhlitis. The perforated vermiform appendix led into an abscess which had penetrated the iliac muscle and communicated with the cæcum.

There were one large and several small abscesses in the pancreas. The two main veins were filled with thrombi; there was a portal thrombosis continued to the liver, and a parietal thrombosis of the vena cava.

There were numerous small abscesses in the brain.

The case reported by Percival,⁹ as of pancreatic abscess, must be regarded as of somewhat doubtful nature. A man of middle-age was sick for three months with jaundice, bilious vomit, and a hard epigastric tumor.

Blood and finally fetid pus were discharged from the bowels. Eventually anasarca occurred. The epigastric tumor proved to be the greatly enlarged pancreas, which was scirrhus, and contained a considerable abscess.

The common duct was impervious from the pancreatic pressure, and the liver was "much diseased."

Andral¹⁰ found two small abscesses in the middle of the pancreas.

In order to determine the relative frequency of suppurative pancreatitis, the conditions of its occurrence, its symptomatology and results, the following thirty-two cases have been collected.

CASE XXXIV.—Male, aged twenty. General abdominal pain, nausea, sense of distention and weight in stomach after eating. Tendency to purge. Dropsy. Pancreas a good deal enlarged, and contained a considerable quantity of pus.—Baillie. *Morbid Anat.*, 1833, 221, 223.

CASE XXXV.—Male, adult. Feeble, scrofulous, phlegmatic. Dull epigastric pain for several weeks, then becoming violent, with nausea, offensive, loose stools, quick pulse, dry skin, sensitive epigastrium. Temporary improvement. Return of diarrhoea, fever, emaciation, weakness. Death at end of more than four months. Pancreas in part hardened, in part full of pus. The pus had escaped into the abdomen. Other organs normal.—Perle. *De pancreate ejusque morbis*. Diss. Inaug., Berl., 1837, 33.

CASE XXXVI.—Adult. Corpulent, apparently much addicted to food and drink. Great epigastric pain, distention after meals, continued dull pain extending into both hypochondria above navel, relieved by purgatives, vomiting, constipation. Progressive emaciation and debility. Stools finally fetid, bloody. Temporary improvement, hectic, and death after nine months of illness and four in house. Intestinal obstruction suspected. Enlarged pancreas formed a purulent mass without healthy structure. Its extremity had ulcerated into the duodenum at lower curvature, through which pus must have passed into the intestine. Liver enlarged, spleen normal.—Fletcher. *Prov. Med. and Surg. Journ.*, Lond., 1848, 20.

CASE XXXVII.—Male, aged forty-one. Indolent; large eater, fond of sweets. For some years attacks of bilious dyspepsia. Last attack seven months ago; did not recover as usual. Emaciated, feeble, dispirited, restless; frequent vomiting, eventually of thin, ropy mucus. Sensation of distended stomach and bowels, in which there was much gas. No appetite, no thirst, sluggish bowels, consistent stools, unmixed with bile and very fetid. No pain nor sensitiveness, nor tumor. Left abdomen dull; tympany in right abdomen and over stomach.

After two months of slight downward tendency, frequent chills and fever. Region between navel, lower border of stomach, and left flank dull, doughy, inelastic, not sensitive. After two weeks, chills ceased and a resistant sore spot appeared above navel and at the left. Edema of feet and legs. Death after eleven months. Pancreas much enlarged, envelopes thickened. Entire gland formed a trabeculated cavity filled with creamy pus and a few cheesy masses about the size of a bean. The duodenum contiguous to the pancreas broke into pultaceous shreds, even on cautious handling. Spleen enlarged one-third. Despite extreme emaciation, a half-inch of fat in the abdominal wall.—Kilgour. *London Journal of Medicine*, 1850, ii. 1052.

CASE XXXVIII.—Female, aged fifty-four. Robust. Some months ago, an attack of disturbed digestion with loss of appetite, flesh and strength, chilliness, morning belching, thin, viscid, liquid vomit. Recovery. Recurrence of antecedent symptoms, with deep-seated, dull pain, pyrosis, slight jaundice, swollen epigastrium. Alternate diarrhoea and constipation; stools white, slimy, not offensive. Gradual loss of flesh and strength. Death. Pancreas wholly suppurating. Spleen natural. Gall-bladder full of bile.—Riboli. *Gazz. Sard.*, 1858. Schmidt's *Jahrb.*, 1859, cii. 177.

CASE XXXIX.—Female, aged sixty-four. Upper part of pancreas a dense, gray callus, in which a few remains of gland substance and round cavities, up to the size of peas, filled with thick white fluid; also several small pus cavities. In the lower part of the pancreas an abscess as large as a walnut. The duct, narrowed at the mouth, gradually widened toward the tail. Posterior

¹ Op. cit., i. 244.

² *Maladies du Pancreas*, 1804, 19, 20.

³ Op. cit., 64.

⁴ *Altenburger Jour.*, 1817. Clässen, op. cit., 264.

⁵ *Anat. Med.*, 1803, v. 352.

⁶ Op. cit., 353.

⁷ Op. cit., 353. ⁸ *Trans. Lond. Path. Soc.*, 1882, xxxiii. 186.

⁹ *Trans. Asso. K. and Q. Coll. Phy.*, Ireland, 1818, ii. 132.

¹⁰ *Précis d' Anat. Path.*, 1829, ii. 582.

wall of the stomach firmly adherent to pancreas, and contained a submucous abscess.—Klob. *Cester. Zeitschr. f. pr. Heilkde.*, 1860, vi. 529.

CASE XL.—Male, aged twenty-three. Well. Severe gastric pain without cause, loss of appetite, sluggish stools, slight fever, sensitive epigastrium, rapid emaciation. In the course of a fortnight, violent paroxysms of stabbing pain spreading laterally from the epigastrium, which was swollen, tense, and tympanitic. Paroxysms attended with transient collapse. In the fourth week, a feculent diarrhoea, which suddenly became thin, profuse, watery, with nausea and bilious vomit. After decided improvement, fever and diarrhoea returned in the seventh week, and the abdomen became much distended. The tympany increased; there were occasional hiccough, progressive weakness, extreme emaciation, and death on the sixty-fifth day. Pancreas large, firm, yellowish-red. Sclerosis of peripancreatic tissue. On section several abscesses, some larger than a bean, at times communicating by sinuous tracts, two of which opened into the adherent posterior wall of the stomach, and two into the duodenum. Spleen of normal size, firm, pale red. Splenic vein obstructed by a reddish-yellow thrombus, in front of which the vein-wall was shreddy and its cavity communicated with a large abscess. A lumbricus lay half in the vein and half in the abscess, and in a sinuous passage leading from it to the duodenum. An abscess as large as a hen's egg in the left lobe of the liver. Fibrinous peritonitis, especially in upper abdomen.—Drasche. *Ber. d. k. k. Kranhenhauses. Rud.-Stift in Wien*, 1868, 301.

CASE XLI.—Male, aged thirty. Intemperate, much exposed when drunk, and then had dyspnoea. Had had two attacks of intermittent fever. Chronic cough for two years. Under treatment for syphilis. After two days of constipation, slight epigastric pain and vomiting, thirst, hot skin, no appetite. The bowels were moved freely. A chill occurred, followed by fever, chills, and diarrhoea toward the end of the week, then slight jaundice, persistent chills, and diarrhoea, and death in collapse on the twelfth day. Pancreas firmly adherent. On section of the enlarged head an abscess opened, the walls thick; contents, an ounce of pus. The dilated duct in the head held several calculi. Spleen weighed eleven and one-half ounces. Lungs phthisical, and containing a central chocolate-colored nodule, from which pus escaped.—Roddick. *Canada. Med. Journ.*, 1869, v. 385.

CASE XLII.—Male, aged twenty-five. Catarrhal symptoms and great debility for two weeks. For two days gastric irritability, nausea, constipation. Then incessant hiccough, epigastrium distended, tympanitic, no pain, no tenderness, constant copious vomiting of thin, brownish, stringy fluid, no jaundice, increasing loss of flesh and strength. Death from exhaustion in six days from the onset of the symptoms of gastric disturbance. Diagnosis, ileus. Pancreas large, head indurated, mortar-like. Duodenum closed by pancreatic pressure, coats thickened. Small omental hemorrhages. Distended gall-bladder.—Nathan. *Med. Times and Gaz.*, 1870, ii. 238.

CASE XLIII.—Male. Pancreas closely connected with neighboring organs. Splenic end contained a small abscess, with thick, greenish-yellow pus. Several small lymphatic glands near duodenal end contained similar pus. Abscess in the diaphragm above the spleen.—Smith. *Dublin Journ. Med. Sci.*, 1870, 201.

CASE XLIV.—Male, aged thirty. Continued fever, severe abdominal pain at level of spleen, which was supposed to contain an abscess; death in a month. Abscess of pancreas, surrounded with adhesions.—Frison. *Marseille Med.*, 1875, xii. 257.

CASE XLV.—Male, aged twenty-eight. Delicate, suffered from hard work and extra hours. Loss of appetite, epigastric pain, jaundice, no fever. In third month, pain in right hypochondrium and shoulder; swollen abdomen,

testicles, and feet. Sudden increase of appetite and thirst, abundant saccharine urine. In the tenth month intense jaundice, extreme emaciation, great weakness, lower abdomen dull, upper abdomen distended and tympanitic. Diabetes persisted, return of fever. Death in coma, at end of ten and a half months. Pancreas enlarged threefold, indurated, infiltrated with pus. A large collection of thick, yellow pus in the tail. Numerous small abscesses in the left lobe of the liver. Enormous dilatation of the common bile-duct. Spleen not enlarged.—Frison. *Loc. cit.*

CASE XLVI.—Male, aged forty. An attack of severe abdominal pain, without cause, followed by tense tympanitic abdomen, which was sensitive. Frequent regurgitation and bilious vomit, constipation, high fever. Death in the course of a week. Pancreas enlarged threefold, reddened, consistency increased, studded with hundreds of abscesses up to the size of beans, many projecting, had burst into abdomen. General fibrino-purulent peritonitis, especially in the upper abdomen.—Friedreich. *Zeimssen's Handb. d. sp. Path. u. Ther.*, 1875, vii. 2. 243.

CASE XLVII.—Male. Strong, temperate. Dislike for fatty food. Sick headaches, left inguinal hernia. After a month of cough and dyspnoea, six months ago, came diarrhoea, wasting, loss of appetite, and jaundice. After seven weeks, a month of considerable oedema. For ten days, epigastric and interscapular pain. Death from exhaustion, after five months of abdominal symptoms. Head of pancreas enlarged. A diffuse abscess followed the course of the ducts and opened into the lesser mental cavity, which was full of pus, and communicated with the duodenum. Fibrino-serous peritonitis. Thrombosis of femoral vein. Cheesy apices, cirrhotic liver, distended bile-ducts.—*St. George's Hosp. Rep.*, 1877-'78 '79, ix. 95.

CASE XLVIII.—Female, aged twenty-nine. Fifteen months ago, pain in region of liver, increasing and shooting, no nausea, poor appetite, bowels regular, feces dark. Jaundice for two weeks, tenderness over gall-bladder, cough, disturbed sleep. After two weeks, apparent convalescence for four days, then return of pain over gall-bladder, nausea, bilious vomit, jaundice, restless, rapid breathing, unconsciousness; death in thirty-six hours. The enlarged and hard pancreas contained an abscess. A round worm, seven inches long, lay partly in the duodenum, partly in duct. Large fatty heart, pale kidneys. Large, pale, soft liver.—Shea. *Lancet*, 1881, ii. 791.

CASE XLIX.—Male, aged fifty-eight. A year ago, loud belching, abdominal fullness, no sensitiveness. Nine months ago pale, sensitive epigastrium; black, tarry stools. Recovered from these symptoms, but was pale and emaciated. After five months, another attack of intense gastric disturbance, lasting a fortnight. Then improvement and gain in weight. After an error in diet, vomiting and severe abdominal pain. Swollen, sensitive abdomen. Pains in both hypochondria. After four days, increasing meteorism, fever, return of vomit, sleepless, progressive weakness, collapse, and death on the eleventh day. Pancreas swollen, anterior surface dotted with numerous yellowish-white prominences up to the size of hemp-seed, alone and in groups, forming cavities with smooth walls and pap-like contents. A group of these gray, gangrenous, covered with shreddy peritoneum. The contents of these cavities were partly granular corpuscles and detritus. The smallest had a wall of small-celled infiltration, similar foci on sections, also narrow and broad bands, and diffused growth of fat tissue. Similar prominences in the transverse mesocolon and mesentery; in the former a circumscribed necrosis with floating shreds and fresh peritonitic adhesions. Abundant sub-peritoneal fat.—Fränkel. *Zeitschr. f. klin. Med.*, 1882, iv. 277.

CASE L.—Male, aged twenty-five. Obscure symptoms

of peritonitis. Pancreas extensively destroyed by supuration. The remaining splenic end, infiltrated with pus, showed a ragged surface, forming part of the wall of an abscess, bounded below by the lowest four inches of the ileum, and above by the stomach, spleen, abdominal wall, and coils of intestine.—Moore. *Trans. Lond. Path. Soc.*, 1882, xxxiii, 186.

CASE LI.—Male, aged seventy-four. Head of the pancreas, partly broken down, formed one wall of an abscess; elsewhere bounded by peritoneal adhesions.—Moore. *Loc. cit.*

CASE LII.—Male, aged thirty-five. Slight jaundice. A large part of the head of the pancreas destroyed by an abscess bounded by pancreas, duodenum, and under surface of stomach. The dilated common duct communicated with the abscess, and the latter opened into the peritoneal cavity and eroded the pancreatico-duodenal artery.—Moore. *Loc. cit.*

CASE LIII.—Male, aged forty-two. Intemperate, exposed to hardship. For some weeks increasing debility. One attack of vomiting, marked ascites. For the next twenty-five days, dull, listless, without appetite, fever, pain. Ill-defined epigastric tumor, not sensitive. Abdomen tapped, refilled in eighteen hours. In the head of the pancreas an abscess as large as an orange. The rest of the gland dense, containing numerous pus pockets. Ducts dilated. The large abscess opened into a pus-cavity, bounded by posterior wall of stomach, pancreas, duodenum, transverse colon, and peritoneum. Portal vein filled with a puriform thrombus extending into hepatic, splenic, and mesenteric veins. Slight cirrhosis, small, soft spleen. Recent peritonitis, bronzed skin.—Musser. *Amer. Journ. Med. Sciences*, 1886, N. S., xci, 449.

CASE LIV.—Male, aged twenty. Ate a probably putrid sausage; sudden nausea, violent vomiting, prostration, alternating heat and cold, severe headache. The next day, chill, cutting pains in abdomen, diarrhoea. On the fifth day, high fever, meteorism, dilated gastric and ileo-caecal regions. A week later, jaundice. After five days the liver became enlarged, painful, and sensitive; the abdomen eventually distended and tense, the stools thin and pap-like; urine frequently contained peptones; one or two daily chills, with atypical and abrupt changes of temperature. Eventually repeated watery vomit, hiccup; death in collapse, at the end of the sixth week. Head of the pancreas contained an abscess as large as a hen's egg, filled with greenish-yellow pus. The greatly enlarged liver agglutinated to the diaphragm, anterior abdominal wall, and stomach; numerous abscesses present, the largest the size of a hen's egg; also dark violet nodules. Vena portæ almost obstructed by a brownish-red thrombus continued into the splenic vein. Behind the pancreatic abscess the portal vein wholly obstructed, the thrombus reddish-gray, in a state of puriform softening. Spleen six by three and a half inches; pulp not readily scraped away, dense, brownish-red. Recent fibrino-serous peritonitis.—Bamberger. *Wiener klin. Woch.*, 1888, xxxiii. *Allg. med. Centr. Zeit.*, 1888, lvii, 1870, 1886.

CASE LV.—Female, aged thirty-nine. Intemperate. Has suffered for a year or two from poor appetite, distress after eating, pain in the stomach, constipation. Sudden epigastric pain, vomiting, constipation; in the course of a few days, after an error in diet, the pain became intense, accompanied with fever. There were constant hiccup and vomiting. The abdomen became swollen and the epigastrium sensitive. The constipation persisted, and intestinal obstruction was suspected. Six days before death, after indulging in alcohol, his symptoms became aggravated, and death occurred on the forty-eighth day. The head of the pancreas contained a trabeculated cavity with green, shreddy walls, which communicated with the parapancreatic fat tissue; a branch of the duct with green and friable walls opened into the cavity. In the fat-tissue at the splenic end of

the pancreas was a cavity containing a dirty-green fluid. Multiple nodules of fat-necrosis are present; also peritoneal adhesions between the stomach and transverse colon in the omental bursa. No general peritonitis. Nothing abnormal in the portal vein or its branches.—*Mass. Gen. Hospital Records* and *MSS. Notes*, 1888, v, p. 131.

They are twenty-two in number. One was of recent occurrence in Boston, for the notes of which I am indebted to Drs. Sears, Thompson, Jones, and Whitney.

The more detailed history of Case LV. is as follows: The patient was thirty-nine years of age, rather fat, intemperate. For a year or two before her fatal illness she had suffered more or less from poor appetite, distress after eating, wind in the stomach, and costiveness.

She was seized with sudden epigastric pain, without known cause, followed by vomiting, and the bowels were constipated. On the following day the pain became worse, but was somewhat relieved after vomiting. The next day, after a dinner of roast goose and cabbage, the pain became much aggravated. It was intense on the fourth day, and there were constant hiccup and vomiting. The epigastrium was sensitive and the abdomen swollen. Pulse 120; temperature 103.4° F. She remained in this condition for several days without any movement of the bowels, and intestinal obstruction was suspected. Castor oil finally produced a defecation which was followed by a lowering of the pulse and temperature.

For nearly a fortnight she was not seen by a physician, and she was then admitted to St. Monica's Home, where she remained two weeks. During her stay she was dull and stupid, suffered from moderate, epigastric pain and sensitiveness, nausea and vomiting, and inability to eat solid food. The skin was not hot to the touch. Pulse 80. Her bowels were kept open by laxatives or enemata. There was a trace of albumin in the urine. The abdomen was full and rounded, and nothing abnormal was discovered on palpation. During the latter part of her stay she was able to sit up daily for a short time. She left the home without the knowledge of the physician, walked some distance, and was supposed to have drunk to excess.

Three days later she was seen by Dr. Sears, who found her suffering from severe pain in the right hypochondrium and epigastrium, with marked prostration. Her thirst was intense, but she immediately vomited everything swallowed. There was constant expectoration of thick, frothy mucus. Pulse 120; temperature 99.4° F. The abdomen was distended, the walls rigid. There was especial prominence of the epigastrium and right hypochondrium. This condition persisted during the three following days at the end of which she was taken to the Massachusetts General Hospital, where she died in the course of a few hours, at the end of the seventh week of her illness.

Dr. Whitney, who made the post-mortem examination, found the pancreas of normal size and density, in general of an opaque-gray color.

At the lower part of the head was a trabeculated cavity with dirty green, shreddy walls and containing cheesy, necrotic material. A large branch of the duct, with a ragged edge, opened directly into this cavity. Its wall near the cavity was green and soft. The main duct was intact, but contained near its outlet a small quantity of dirty brown, viscid fluid. The parapancreatic fat-tissue formed a part of the wall of the cavity above mentioned. Near the splenic end of the pancreas was a hole in the fat-tissue as large as a walnut and containing a dirty green fluid. Elsewhere in the neighboring fat-tissue, and in that of the mesentery, meso-colon, and posterior abdominal wall were numerous opaque-white, pap-like nodules from the size of a pinhead to that of a

pea. They were at times aggregated in clumps; the contents could be squeezed out. The smallest nodules were frequently surmounted by an injected border.

There was nothing abnormal in the portal vein or its immediate radicles. The liver was in a condition of brown atrophy, and there were minute, pale yellow calculi in the gall-bladder and common duct. There was no evidence of a general peritonitis, but on cutting through the meso-colon the stomach and colon were found slightly adherent. The microscopic examination of the fat-tissue showed characteristic, necrotic patches with a margin of round-celled infiltration. Also occasional small abscesses and more diffused infiltrations of leucocytes.

In addition, occasional, circumscribed, round spots were seen, composed of more or less elongated and flat cells, enclosed within a fibrous border. The cells varied in size, some being considerably larger than fat cells and containing several nuclei, while the smallest had a diameter four times that of a red blood-corpuscle. These patches suggested a lymph vessel plugged with desquamated and oedematous endothelium.

Dr. H. Jackson, under the supervision of Dr. Ernst, made a bacteriological analysis of the necrotic fat tissue from the above case. From Dr. Ernst's report it appears that four varieties of bacteria were isolated:

1. A liquefying, fluorescent organism, which proved to be a fine, short rod, half the size of the bacillus of tuberculosis.
2. An organism closely resembling the staphylococcus pyogenes citreus, both in the manner of its growth and in its microscopical appearances.
3. Very short, rather thin, non-liquefying rods, which formed thin, grayish, almost translucent and much wrinkled pellicles on the surface of the gelatine and agar-agar, around the mouth of the needle track.
4. The only organism found in large numbers. The cultures grew as finely beaded colonies along the needle track, with a flat, pearl-gray top extending two or three millimetres over the surface of the nutrient material. Microscopic examination showed the organism to be composed of very short, thick rods, resembling somewhat the appearances found in one or two of the sections of the necrotic tissue. It did not liquefy the gelatine.

Of twenty-one patients, seventeen were males and four were females; all were adults, whenever ages were mentioned, and in eighteen cases the age was given as follows:

Years of age.	Number of cases.
From 20-25	3
" 25-30	4
" 30-35	2
" 35-40	2
" 40-45	3
" 45-50	0
" 50-55	1
" 55-60	1
" 60-65	1
" 65-74	1

Previous attacks of indigestion of greater or less frequency and severity were present in about one-fourth of the cases. These attacks were usually regarded as gastric or bilious. One patient suffered from sick-headache, while another was subject to diarrhoea during his drinking bouts. Three were distinctly intemperate, two might be regarded as gluttonous, and one was exposed to hard work and extra hours.

The immediate attack was precipitated in two instances by errors in diet, in the one case a probably putrid sausage having been eaten. The attack was greatly aggravated in a third case by a dinner of roast goose and cabbage. Two weeks of catarrhal symptoms with great debility were the antecedents of another case.

A striking feature in the history of these cases of suppurative pancreatitis is the tendency of this affection to become chronic. Of fourteen cases, six were fatal in the first month, three during the second month, and five at various periods between four and eleven months. Death might take place at the end of the first week and even the more chronic cases often began with distinctly acute symptoms.

It is, therefore, desirable in the consideration of this series of cases to group them with particular reference to the rapidity of their course.

The cases of acute, suppurative pancreatitis usually began suddenly with severe, generally intense gastric, epigastric, or abdominal pain, vomiting, and sometimes great prostration. The vomiting might be incessant and distressing, or it might give temporary relief to the pain. The ejected fluid was sometimes stringy and brown. The bowels were usually constipated, although diarrhoea might occur within the first twenty-four hours. This latter symptom was not infrequent at a later date of the disease.

Fever, usually slight, was the next conspicuous symptom, being manifested about the third day. At the same time the upper abdomen, especially the epigastrium, was likely to become distended, tympanitic, and sensitive. Hiccough, sometimes quite obstinate, was not infrequent at this stage, and occasional chills were to be met with. The abdomen, in general, then became moderately swollen, tense, and tympanitic.

With the violent onset and persistence of these symptoms death might occur, perhaps in the course of a week or more.¹ The pancreas then was markedly enlarged, reddened, and studded with hundreds of small abscesses, many of which had burst into the peritoneum. The associated fibrino-purulent peritonitis was most marked in the upper abdomen. In the second case,² where death resulted in eleven days, the attack was apparently recurrent in a corpulent person who had suffered for a year from symptoms which might be attributed to pancreatic disease. There were found in the pancreas numerous small, yellowish-white prominences, alone and in groups, with soft, pap-like contents. They were present on section as well as superficially. The contents were fatty-degenerated cells and detritus. The walls of the smallest cavities were infiltrated with round cells while those of the others were smooth. A group of these prominences were grayish discolored, gangrenous, the superficial peritoneum being perforated and shreddy. Similar nodules were found in the mesentery and in the transverse meso-colon. In the latter was a circumscribed necrosis with floating shreds and fresh, peritonitic adhesions. The pancreas was irregularly traversed by narrow and broad bands and by a diffused development of fat-tissue. Not only does the clinical history of this case suggest a recurrent and finally fatal attack, but the pancreatic lesions also point to a long-standing process. Fibrous bands, fatty-degenerated cells and smooth-walled cavities filled with

¹ Case XLVI.

² Case XLIX.

detritus favor this view. The description of these nodules suggests that many of them were probably foci of fat-necrosis, with gangrenous sloughing of the superjacent peritoneum.

An acute suppurative pancreatitis, however, very rarely terminates at this early date. The symptoms already described may persist for three or four weeks, with progressive emaciation and debility, and death occur from exhaustion. Under such circumstances the single abscess has been found surrounded with adhesions.

In another series of cases, beginning equally violently, there may be frequent chills and irregular, atypical, often high, fever, the maximum temperature being 105.8°.

Slight jaundice may be associated. The pains extend into the hypochondria and may spread from this point downward.

The liver, perhaps the spleen, may be palpably enlarged—the symptoms are conspicuously those of blood-poisoning, and the patient dies collapsed in the sixth or seventh week. An abscess as large as large as a hen's egg, filled with greenish-yellow pus, may then be found in the pancreas. Also a pyelophlebitis apparently the result of the pancreatic abscess and associated with multiple abscesses in the liver, and acute peritonitis.¹ Death at the end of seven weeks may result from the extension of the pancreatic abscess to the parapancreatic fat-tissue, with the production of multiple nodules of fat-necrosis.² In this case the symptoms of epigastric pain, vomiting, constipation, and swelling were interrupted by a period of several weeks of comparative comfort to be followed by marked prostration, incessant vomiting, severe epigastric pain, and fever.

Another event in the history of acute suppurative pancreatitis, found in the course of the third or fourth week, is the tense and swollen, painful, and sensitive upper abdomen which follows the pain, vomiting, constipation, and fever. A diarrhoea then becomes conspicuous, perhaps preceded by violent paroxysms of lancinating pain shooting laterally in the epigastrium, producing temporary collapse.

The loose stools may be thin, yellow, and feculent at the outset and then become profuse and watery. This symptom may then subside, with a lowering of the fever and a general improvement, to recur after a few weeks with fever and abdominal distention, progressive emaciation; and increasing weakness, ending in death in the tenth week.

Several small abscesses have then been found in the enlarged and firm pancreas, with sclerosed peripancreatic tissue. Communicating sinuses unite these abscesses and open into the adherent stomach and duodenum. A splenic thrombo-phlebitis and a hepatic abscess may be associated, also a fibrinous peritonitis especially marked in the upper abdomen.³

The early symptoms may be less severe and the disease be announced by progressing weakness and emaciation. Loss of appetite, slight jaundice, perhaps diarrhoea, may occur. There may be neither fever nor pain, or there may be obscure symptoms of peritonitis.

Finally, anasarca or ascites becomes apparent, and death occurs from exhaustion, perhaps at the end of five months. The pancreas may then contain a diffused

abscess, following the course of the ducts and opening into the cavity of the lesser omentum, which was filled with pus, and in its turn emptying into the duodenum through a sinus in the mesentery. These conditions being associated with a fibrino-serous peritonitis. The pancreatic abscess may extend at an earlier date even to the omental cavity, thus forming a great pus-cavity extending as low as the lowermost coils of the ileum, and walled in by adherent intestines and stomach. The greater part of the pancreas may be destroyed. The common duct may open abruptly into the abscess of the pancreas, and leave it at the hepatic end. There may be an associated thrombosis of the portal vein continued into its primary sources, and the pancreaticoduodenal artery may be eroded, with hemorrhage into the cavity of the abscess. A recent peritonitis may be associated, and in one of these somewhat protracted cases with extension to the omental cavity, a bronzed skin was present.

Finally, there are the most chronic cases, which extended over a period of nearly a year. As a rule, no severe pain occurs at the outset, but the patient gradually becomes weak and thin, vomiting may be frequent, and a sense of distention of the stomach after meals or of epigastric pain be complained of. There may be little or no fever, or periods when chills and fever occur. The stools may be consistent, not colored with bile, and very fetid, or later they may be very offensive and mixed with blood. There may be a free communication between the pancreatic abscess and the duodenum, or the latter may break into pultaceous shreds when handled. The entire pancreas may be converted into a trabeculated cavity filled with creamy pus and cheesy masses, or it may be indurated and infiltrated with pus. In one of these protracted cases¹ diabetes appeared after the third month.

Noteworthy in these cases of suppurative pancreatitis is the rarity with which a circumscribed tumor is to be found. A swollen, tympanitic epigastrium is the rule, and very rarely a circumscribed resistant spot was to be felt above the navel, to the left of the median line.

Jaundice occurred in less than one-fourth of the cases. It was then usually slight. Its intensity in one case was connected with abscesses in the liver and dilated bile-ducts.

Another fact of considerable importance is the usually small size of the spleen. The rule was, that no enlargement was noticeable even in those cases in which the thrombotic obstruction of the splenic or portal vein was recorded. The small spleen was usually of normal density.

From the above consideration it is evident that there are cases, few in number, of acute suppurative pancreatitis, which run a course similar to that described in connection with hemorrhagic inflammation. They may begin with equal suddenness, present the same grouping of symptoms, but are not so early fatal. They are more rarely associated with evidences of fat-necrosis, which were present in but two instances.

Although Klebs² regarded pancreatic abscesses, not arising from a peripancreatitis or from suppurating cysts, as of doubtful existence, it is apparent that this view is opposed by the evidence here recorded. It is also evident that the extension of an abscess from the neighbor-

¹ Case LIV.

² Case LV.

³ Case XL.

¹ Case XLV.

² P. 21.

ing lymph-glands to the pancreas is of extreme rarity. The only evidence in favor of this view is that offered by Portal,¹ and in the case² reported by Smith. The possibility that a pancreatic abscess may be due to inflammation of the appendix is evident from Moore's case,³ although the connection between the two may have been through a mesenteric thrombo-phlebitis, arterial embolism, or through the coexistence of acute pancreatitis and appendicular inflammation.

The possibility that a pancreatic inflammation may be excited by the passage of a lumbricus into the pancreatic duct is admitted in connection with the appearances in Case XLVIII. It is still more probable, however, that the worm entered the pancreas after the establishment of the inflammation. Its presence there might be merely accidental, even taking place after death, as is likely to have been the fact in Case XL.

(To be continued.)

ORIGINAL ARTICLES.

REPORT OF A CASE OF HYSTERO-EPILEPSY IN A MAN.

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THE patient, J. J. B., æt. twenty, single, was a tall, muscular fellow, whose intellect, if anything, was a little impaired. He was admitted into the nervous ward of the University Hospital, Oct. 26, 1888, under the care of Professor H. C. Wood.

From his mother the following history was obtained: Was of Irish parentage, born in the United States. Family history uncertain but apparently not important. At the age of seven had diphtheria; otherwise was always healthy up to twelve years of age when he fell down a flight of iron stairs at school and struck his head against the last step. He was sliding down the banisters at the time and slipped and fell from the second-story to the bottom of the building. The fall did not harm him greatly as he was not rendered unconscious, nor did he experience much subsequent pain. Since this accident he has complained, more or less, of a localized tenderness upon pressure being made over the region of head struck.

When thirteen years old he had another severe fall, this time through an open hatchway a distance of ten or fifteen feet. Fell upon his side, but with the exception of some slight bruises he escaped serious injury. Two years later, at the age of fifteen, he became subject to fits. Had never been affected so before. Stated that he was always aware of their oncoming but was not conscious during the attacks. He never falls during these paroxysms, as his knowledge of the arrival of an attack is such that he is enabled to lie down before its onset.

Acknowledges indulging in unnatural abuse of the sexual function, or masturbation, since he was twelve years old. Also states that he has been subject to involuntary seminal emissions, occurring sometimes as often as two or three times during the twenty-four hours. As a result he gradually became

depressed and was constantly reminded of the fact that he had ruined himself, as he supposed for life.

His condition upon admission to the hospital was as follows: Physically he was well proportioned and in good general health; mentally and morally he was found deficient. His face was careworn; eyes bloodshot and restless, indicative of his mental excitement. Had used tobacco to excess but under medical advice had stopped it; never indulged in stimulants of any sort.

The frequency of the fits, at this time varied. Sometimes two to three a week; again, he would be free from them for days, but never more than a couple of weeks at a time.

Examination of the viscera was negative. There was slight palpitation of the heart, but not very marked. Firm pressure over the region of the head hurt in the fall, as previously mentioned, caused a cry of pain and provoked considerable emotional excitement, patient saying that unless it was stopped he would have a fit, all the while squirming around and contorting his body as though in great suffering. It was never possible, however, to bring on an attack by this method.

It might be stated here that moral persuasion combined with a sedative medicinal treatment soon brought about a change for the better in the patient's condition, both mentally and morally. The involuntary nocturnal seminal emissions were gradually lessened in number until it now might be said that they are simply physiological.

A description of one of his attacks will suffice to illustrate the rest, and as my notes of his first fit which I witnessed are the fullest account that was recorded, I will give it in detail.

It was fully a week after entrance into hospital that he had one of the paroxysms. Two days previously he complained of a feeling as though a ball was rising up and sticking in his throat, the *globus hystericus* of writers. Soon after this he remarked that an attack was near at hand. This sensation the following day was supplemented by a sort of stupor, associated with a tendency to melancholia, and a noise in head resembling escaping steam, which was most marked upon the right side. The next day about 3 P. M. I was hurriedly sent for, saying that J— was about having a fit. I found him lying in bed. He remarked that his eyes were heavy and misty and that his head felt as though it were expanding and would burst. Soon a twitching of the eyelids was noted; then of the muscles of the face, particularly of the mouth; these were followed by a convulsive tremor which seemed to pass down over the entire body and limbs. Head moved from side to side. Eyes became fixed and staring. He ground his teeth together and some difficulty was experienced in keeping the tongue from being bitten. Respirations became shallow and slow, and at times seemed to stop. A series of convulsive movements next ensued; not, however, of a very marked or active type. These were followed by rigidity of muscles and pronounced opisthotonos—not of the extreme type but sufficient to attract attention. This attack lasted for about a quarter of an hour and ended by his becoming gradually calm and muscles

¹ Loc. cit.

² No. XLIII.

³ No. L.

relaxed. He then sat up in bed and gazed vacantly around. Upon being spoken to, he seemed to understand fully what was said, but his answers were given in a very hesitating way. In about another fifteen minutes from the time the paroxysm started he became quiet and laid down. There was no rise of temperature after the attack. During the spasm he seemed to be unconscious of his surroundings. He remarked afterward that all he could remember of the attack was somebody speaking about the necessity of placing something between his teeth to prevent him biting his tongue, and that he had a queer, confused sound in his head which was probably just before he regained consciousness.

The treatment of this case, directed toward controlling the epileptic seizures, did but little, if any, good; his condition vacillating, sometimes worse, sometimes better. Finally, at the suggestion of Professor Wood, on the 23d of last November, the patient was thoroughly etherized and a circular flap of tissue was cut and dissected up over the region of the tender spot upon the head. The wound thus made was sewed up, dressed antiseptically, and bandaged. He was put to bed and kept there for two weeks. When he recovered from the anæsthetic he was told that the operation had been entirely successful, and that he would not be liable to any more fits; or, if so, they would be very mild in character and would occur at rare intervals.

At end of time, as stated above, he was allowed to get out of bed and put at light work about the ward. At the beginning of this year he was discharged from the house, and up to present writing—two months and a half since the operation—he has had but two slight returns of former attacks. These were brought on by undue excitement incident to participating in athletic sports. He is now enjoying excellent health, has no seminal emissions, and shows no tendency to have a further return of the old trouble.

Hystero-epilepsy in the male is a rare affection. The diagnosis is based upon the following points of difference between

Hystero-epilepsy (in this case), and	True idiopathic epilepsy.
1. Attacks never occurred at night.	1. Frequently occur at night (Da Costa).
2. Never ushered in with a cry.	2. Usually the patient screams at the onset of a paroxysm.
3. Was not the result of heredity.	3. Heredity plays an important factor in its etiology. (According to Gower, 35 per cent.; Hamilton, nearly 50 per cent.)
4. Gradual loss of consciousness.	4. Sudden and complete loss of consciousness.
5. Seldom fell; always knew when attack was coming on.	5. Usually fall, and with frequent serious injury resulting.
6. The frequency of attacks showed no influence upon patient's mental or physical condition; the trouble previously alluded to in this respect being attributed to the results of self-abuse; a fact later fully demonstrated by the result of treatment directed to this trouble.	6. The number of attacks have a decided effect on the mental condition (Mills).

7. Patient was of good physique and well nourished.

8. Only slight distortion of countenance.

9. Pupils reacted to light.

10. Convulsions were clonic, as a rule, and equally distributed over entire body.

11. Paroxysms were not usually followed by sleep or any perceptible impairment of intellect.

7. The reverse of this is true

8. Distortion of face and eyes usually very great.

9. Generally the pupils are insensible to light.

10. Convulsions often more marked on one side than on the other, and more tonic than clonic; usually, however, the spasms are universal (Wood).

11. It is the exception when attacks are not followed by profound sleep, by headache, and dulness of intellect.

The prognosis here seems to be favorable. The sham operation through which he went, and which effected so decided an influence upon his condition, through the mental impression which it made, will possibly result in a cure.

A somewhat similar case, of a woman, is reported in the *Lancet*,¹ under the title of "Castration in Hysteria," in an hysterical patient who had suffered for years from obstinate vomiting and severe ovarian pains. She became very weak, and finally consented to oöphorectomy as the only hope. The operation—performed under an anæsthetic—was a mockery, the skin only being incised; she was, however, perfectly cured.

At the meeting of the American Neurological Association (June, 1884), in the discussion which followed the reading of a paper by G. L. Walton,² Spitzka, of New York, cited a case of Israel's, of Breslau, in which a patient was cured of hystero-epilepsy by a sham operation—a superficial incision in the parietes of the abdomen.³

It is true that cases supposed to be cured often relapse, but it is hoped that such will not be the result in this incident. The general improvement, both in regard to his sexual organs as well as his mental state, is against a return of the disease. So is the sudden cessation of the attacks, which previously to the operation occurred several times weekly. Likewise, the fact that we have a male to deal with instead of a woman is additionally favorable.

ON UNUSUAL METHODS OF ACQUIRING SYPHILIS, WITH REPORTS OF CASES.

BY L. DUNCAN BULKLEY, A.M., M.D.,
OF NEW YORK.

(Concluded from page 236.)

II. SYPHILIS BREPHOTROPHICA.

Two great divisions are met within this group, relative to: 1, the nutrition of infants; and, 2, attendance upon them. Literature is very full of data

¹ *Lancet*, vol. ii, p. 588.

² A Contribution to the Study of Hysteria as Bearing on the Question of Oöphorectomy.

³ Mills: Hystero-epilepsy (*Pepper's System of Medicine*, vol. v, p. 312).

bearing upon this branch of the subject, and many of the points connected with it are so familiar that they need only be mentioned. Happily, this mode of communicating syphilis is becoming more rare as its dangers are more recognized, and it could hardly be possible now to have such epidemics of syphilis from this source as have been reported in earlier times. Thus, in a little town in the southeast of France the celebrated "Pian de Nerac" occurred, in which more than forty women and children were infected with syphilis before the nature of the trouble was recognized, it all starting from a single syphilitic child.

But isolated cases are still constantly occurring, and among my sixty-six cases of extra-genital chancres are found six instances of chancre of the breast, and there were also at least four children known to have been infected from them. The following case illustrates the fact that infection may sometimes take place even when the nature of the disease is known, and greater or less precautions are exercised against infection.

CASE VIII.—Mrs. X. M., a very intelligent patient, was obliged by the sudden death of her husband to take a strange child to nurse, when her own was but a few months old. Fearing contamination, she very carefully kept the strange child on one breast, while she sedulously gave the other alone to her own child. Within some weeks the foundling died, with fully developed hereditary syphilis, and the mother then gave both breasts to her own child. In the course of some weeks later the breast which had nourished the strange child became sore on the nipple, and the ulcer resisted treatment for a long time, so that after awhile her own child ceased to nurse from it, and was kept on the other breast alone. In the course of time the mother became affected with general symptoms, and applied for treatment with a well-marked papulo-tubercular syphiloderm. Her child soon developed syphilis also, but it was never learned where the poison entered. It is more than probable that the lesion was in the mouth and gave very little trouble, as is commonly the case in infants who acquire syphilis at the breast. The child, however, suffered severely from constitutional syphilis, and was under my care through a number of years, and had considerable bone disease.

Syphilis has frequently been communicated also by means of the hand-feeding of infants, and cases are on record where feeding-bottles, sugar-teats, spoons, cups, etc., have been the means of conveying the poison, which need not be dwelt on at present.

The ordinary care of infants also affords a frequent opportunity for the interchange of syphilis between them and their attendants, in both directions. Various articles used in the nursery toilet have been reported as conveying syphilis, such as sponges, syringes, combs, napkins, etc.; and one infant

acquired the disease from contact in a cradle with the lining which had become saturated with the secretions of a syphilitic child. Scratches and tooth wounds given by infants have also been known to communicate syphilis to attendants, while they in turn have not infrequently infected healthy children by fondling, by means of extra-genital chancres in various locations. A number of cases are on record where attendants have acquired a chancre in the site where a syphilitic infant had rested in carrying; in one instance, reported by Waller, the attendant was seventy years of age.

III. SYPHILIS TECHNICA.

This third main class of *syphilis insontium* embraces a large number of sub-groups, with a variety of individual methods of transmission of syphilis, in connection with the various forms of body service, medical and surgical, as also by nurses and attendants on those affected.

We find here three very distinct main divisions, according as, 1, when the operator is the victim; 2, when the operator is the syphilifer; and 3, when the operator is the medium.

1. *When the operator is the victim.* Physicians and others in the pursuit of their profession have, as is well known, acquired syphilis in almost numberless instances, and in the most unsuspected manner, and it is hardly necessary more than to allude to the subject.

Cases are on record where the poison has been received by surgeons during operations, and also by anatomists during dissection; it is also not infrequently acquired during manipulative proceedings, and students and others at venereal clinics have contracted chancres on the fingers and elsewhere in the careless handling of syphilitic *seres*. Jullien¹ relates a case where an eminent specialist who had a slight bleeding wound on the finger was called upon to examine a chancre on the upper surface of the glans penis. He held the wounded finger carefully aloof from the sore, but during the examination he found that there was a second chancre of the scrotum which had just come in contact with the finger which he had striven to protect. Realizing the danger he at once washed carefully and thoroughly cleansed the part, but all in vain, as a chancre formed on the wounded finger and the syphilis ran its course. Dentists have also been reported to be infected in practising their profession.

The largest numbers of syphilitic inoculations in this group are furnished by accoucheurs and midwives, and very many instances of this nature are recorded in literature.

¹ Jullien, *Traité pratique des mal. ven.*, 2d ed, Paris, 1886, p. 537.

In the list of extra-genital-chancres already given, there are found seven cases of chancre of the finger, five of which occurred in physicians. The following case is of peculiar interest, inasmuch as the sufferer also infected his wife, although he had exercised as he thought, the utmost caution against such a misfortune.

CASE IX.—Dr. X. C., aged thirty-one, first noticed a soreness about the base of the nail of the third finger of the left hand during the latter part of June, 1884; this increased in severity until a chancre of some size developed, which remained, though partially healed, at the time of his visit in September of the same year. He had had only local applications, including burning with nitrate of silver.

Ten days before his visit a slight eruption had appeared upon the forehead, which increased, so that when he presented himself most of the body was covered with a characteristic maculo-papular syphilide; there was also malaise, with aching in the limbs which he had considered malarial and had treated with quinine. There were also very general adenopathy and soreness of the throat just beginning, and later he had a severe iritis and other symptoms of constitutional syphilis. When first seen the entire end of the finger was thickened and red, the nail raised from its bed, and at its root an ulcer was seen circular in shape, presenting an almost healed, purplish, glazed appearance. The infection was traced to a confinement case about a month previous to the appearance of the sore, when a hydrocephalic child was delivered dead born of a mother whom he believed to be syphilitic.

Almost six months after the first visit of Dr. X. C., he brought his wife to me with a fading maculo-papular syphilide, presenting very characteristic lesions about the mouth and chin, with mucous patches abundant in the throat, and general adenopathy. The history was that nearly two months after her husband's first visit she had begun to feel poorly, with malaise and bone-ache, until about a month later she took to the bed, with what was suspected to be typhoid fever by several physicians who saw her. A slight eruption had appeared on the abdomen and chest, which was regarded as an usual form of the typhoid exanthem. A month after the time that she took to bed the throat began to be sore, and soon the glands in the neck became enlarged.

No clew could be found as to the method by which she received the poison; she had no initial lesion on any external part of the body or buccal region, nor could any trace of a primary sore be found in the genital region or vagina, even by a well-known gynecologist, who examined deeply for it. The case might possibly lend weight to the supposed communication of syphilis by the seminal fluid, and her husband, who had studied the case carefully, suggested that infection might have occurred through a pregnancy, as it was thought that she possibly might have had a miscarriage very early in conception, as there was at the time a delay in her menses, but of this they could not be certain.

In one of the instances of chancre of the finger in the list, the infection occurred on the third finger of the right hand in a lady who had taken all the care of a relative who had an ulcerative disease about the eye, changing the dressings, etc., during six or seven months; during this period the finger became sore at the root of the nail, and as the ulcer healed she had a general eruption, with malaise, bone-aching, etc., followed also by later manifestations of constitutional syphilis.

Physicians and attendants upon syphilitics have also received the infection in other regions than the fingers, and cases are on record where chancres have thus occurred on the eyelids, nostrils, and lips, from conveying the poison on soiled fingers or otherwise, and more than one instance has been reported where the patient has projected the virus by coughing in the face of the physician, and chancre of the eyelid or elsewhere has resulted. One case is on record where a physician acquired a chancre of the tonsil by practising artificial respiration with the mouth on a syphilitic child. Many instances can be found where individuals have become infected by sucking recent wounds, and also by breast-drawing with the mouth.

2. *When the operator is the syphilifer.* In this instance the operator having syphilis communicates his own disease to another by means of some body service. The number of reported cases falling under this category is very large, and come under a variety of heads. We have already seen that accoucheurs and midwives often contract syphilis in their calling; and, on the other hand, numerous instances are on record where they have been the means of spreading the disease to others, and even in large numbers. The celebrated epidemic of St. Euphemie in France was of this nature. A midwife acquired a chancre on the right index finger, followed by a full attack of constitutional syphilis. She continued her calling for four months and communicated syphilis to more than fifty women, and through them at least thirty others were infected. In another epidemic in France over one hundred were thus infected with syphilis, and very recently Klein has reported an epidemic in England in which thirty married women, nine husbands, and two infants contracted syphilis, directly or indirectly, from a diseased midwife.

The operation of breast-drawing by the mouth has also in times past proved a very fruitful opportunity for the intercommunication of syphilis; we have already mentioned the acquiring of syphilis by the operator in this manner, and there are abundant instances on record where the disease has by this means been conveyed to numbers of innocent victims. As early as 1654 an event of this nature was reported, where a professional breast-drawer infected

many nursing women with chancre of the breast, and these in turn gave syphilis to their nurslings, who again communicated it to others. Although this practice is less common in this country and among the more highly civilized people than among the peasantry of European countries, yet cases of this nature still occur here and there, and at times breast-drawing by the mouth has given rise to epidemics of syphilis of considerable size. Leloir¹ has reported an epidemic of this nature occurring as late as 1880, where a woman acquired a chancre of the lip and she infected four women on the breast, who in turn gave syphilis to three nursing infants, one of whom, as also one of the women, died of the disease; one of these infants infected its father through the nursing bottle, and another infant gave the disease to its wet-nurse, who again transmitted it to her own infant.

Among the more curious and unexpected methods of communicating syphilis innocently may be mentioned the practice, sometimes followed, of removing foreign bodies from the eye by means of the tip of the tongue. In two small villages in Russia, Tepljaschin² found, among a population of 532 persons, no less than sixty-eight individuals, twenty-three males and forty-five females, who were affected with syphilis, about one-quarter of them being under ten years of age. One-half the entire number had been infected directly by a female quack, who had followed the industry of removing foreign bodies from the eye, and treating trachoma, with the tongue. The woman had herself received the disease in her calling and had continued to spread the same. A number of single instances of the same method have been recorded, and of these at least two³ have been reported in this country.

Syphilis has also been communicated by means of the sucking of recent wounds, as we have also seen that it may be acquired by the operator in this manner.

Tattooing is now well recognized as one of the avenues through which the syphilitic virus may be accidentally introduced, and a total of no less than seventy-five cases of this nature have been found, reported by a number of different observers. As is well known, the poison is commonly, if not always, supplied from mucous lesions in the mouth of the operator, by means of the saliva used to moisten the needles or ink during the operation.

Among the personal cases of extra-genital chancre before alluded to, there was one where the disease was undoubtedly received in this manner through a tattoo on the right forearm.

3. *When the operator is the medium.* Our last group of cases comprises those where the operator serves as the medium to convey syphilis from one person to another, by means of various forms of body service. A large number of instances are on record where this has happened, and many of the facts are well known to all and need but to be mentioned.

Vaccination is, perhaps, one of the most widely recognized instances coming under this class, the first authentic cases being reported by Marcolini as occurring in Lombardy in 1814, in which out of forty subjects vaccinated from a child with inherited syphilis almost all were infected. Hundreds of cases have been reported since that date, many of these occurring in epidemics of some size; thus, at Schleimitz and St. Vait in Styria, Koccevar reported an infection of sixty-six persons, of whom thirty-one were vaccinees, from whom nineteen mothers, and eleven others, including children, received syphilis. The epidemic at Rivalta, Italy, is a well-known instance of this mode of infection.

Ritual circumcision has also furnished numbers of victims of syphilis, who commonly receive the infection by the practice of staunching the blood by the mouth of the operator. The first reported cases of this occurred in 1805, since which time many observers have reported cases, and on one occasion, referred to by Jaffe,¹ thirty boys were inoculated by one operator in Vienna.

Injuries made by dental instruments have been reported by several observers to be followed by syphilis at the site of injury; in these instances, the supposition is generally that the poison had been conveyed by the instrument which had received it from mucous lesions or blood from the mouth of a syphilitic person, it not always having been sufficiently cleansed. Roddick² reports a case where a chancre formed at the site of extraction of a tooth, the gum being considerably lacerated in the operation.

The following very interesting case illustrates the inoculation of syphilis following a wound by a dental instrument in the tongue.

CASE X.—Mr. X. W., a gentleman of intelligence and position, aged sixty years, came to my office on account of a sore on the tongue which he feared to be a cancer. The history was that, ten weeks before his visit, he had first noticed a little point of soreness on the tongue, which had gradually increased in size, in spite of treatment at the hands of another physician, who had evidently not recognized its character, until latterly it had come to give him so much annoyance that he was conscious of its presence at all times.

¹ Leloir: *Leçons sur la Syphilis*, Paris, 1886, p. 54.

² Tepljaschin: Cited in *Viertelj. f. Derm. u. Syph.*, 1887, p. 1138.

³ Cited by de Beck, *Hard Chancres of the Eyelid and Conjunctiva*, Cincinnati, 1888, p. 48.

¹ Jaffe: *Die rituelle Circumcision*, etc., Leipzig, 1886.

² Roddick: *Montreal Medical Journal*, vol. xvii. No. 2, 1888, p. 93.

On examination there was found on the right side of the tongue, about an inch from the tip, a hard, inflamed mass, nearly half an inch in diameter, ulcerated in the centre, and with the edges somewhat everted; it was not ordinarily painful, except when irritating food or drink touched it; there was already a small, enlarged and painful gland beneath the jaw on that side. Thinking that possibly the lesion might be due to local irritating causes, he was given a soothing mouth-wash, and an alkali internally. Five days later there was a marked improvement; he had had some roughened teeth smoothed off and had left out his set of artificial teeth. The ulcer then looked less irritated, but its margin was more clearly defined, and the edge harder, the submaxillary glands of that side were more swollen and hard.

The diagnosis of chancre of the tongue was then recorded, and he was placed upon anti-syphilitic treatment, under which the sore rapidly improved; some days later a general maculo-papular eruption appeared, affecting even the palms, with other signs of constitutional syphilis. The ulcer healed rapidly and in six weeks there was only a scar with slight hardness at its base.

In searching for the mode by which the syphilitic poison gained entrance, it was learned that during the month or so previous to the occurrence of the tongue chancre he had been, through the persuasion of a friend, under the care of a dentist of a cheaper advertising order, who, he had noticed, was not at all cleanly in his person or instruments. He could not determine accurately the date of particular injury of the tongue, but work had been done in that portion of the mouth, and he remembered having the instrument slip occasionally. The patient was a married man, with a family, and had certainly not been exposed in any other manner; he was repeatedly questioned on this point, and was himself anxious to learn how he had acquired the disease.

The probability is very strong, therefore, that the poison was conveyed on the dental instrument from some preceding patient who had active syphilitic lesions in the mouth. The likelihood of such exposure and contamination of dental instruments in the hands of those who are careless as to cleanliness is very great, and is illustrated by the fact that this very patient, while under my observation and before the nature of the ulcer on the tongue was determined, and while it was secreting freely, had himself been to another dentist and had had the teeth adjoining the ulcer filed and polished. Too great care can hardly be exercised in warning patients with active mouth lesions of syphilis, or indeed all those in the early, infection period of the disease, against exposing others in this manner.

In earlier times, and especially in rustic communities, the operation of wet-cupping has on repeated occasions given rise to syphilitic contagion, and a number of epidemics of this nature are on record; the earliest of these is the celebrated "Maladie de Brunn" in Moravia, in 1578, where no less than eighty persons were infected in three months by this means, in addition to about one hundred in the

surrounding country. In Finland repeated epidermis have occurred from this cause, and in one instance nearly two hundred persons were infected.

Minor surgical operations, such as opening abscesses, scarifying a hydrocele, the use of serrefines after circumcision, and also skin-grafting, have all given rise to chancres at the site of the wound, followed by constitutional syphilis.

Razor wounds also, have not infrequently afforded an opportunity for the entrance of the syphilitic poison, the inoculation occurring possibly during shaving, possibly afterward from other sources.

Among the personal cases of extra-genital chancre already referred to, occur three striking cases illustrative of this mode of infection, and a fourth one, not quite so certain. One of these, which is of special interest from the intense severity of the subsequent syphilis, will suffice to illustrate the subject.

CASE XI.—Mr. XX., a druggist, aged thirty-three years, unmarried, came to my office in 1882, on account of a general eruption of a papulo-squamous character, covering almost the entire body and extremities. Although he had been exposed he had never contracted any venereal disease, and at the time of his visit there was no trace of a chancre on the penis or elsewhere, except as to be mentioned.

Upon the left cheek, however, there was a sore which at once attracted attention, and which proved to be a chancre, with the following history:

He had always been shaved at barber-shops, by different persons, using the public brushes and cups indiscriminately. About two and a half months before his visit his cheek had been cut by a new barber, who, he noticed, was uncleanly in his person and habits, and who shortly left the employ. A pimple soon formed on the site of the injury, which was again cut from time to time by the razor, and the place covered with court plaster; the sore enlarged, and later the crust was allowed to remain upon it. Some weeks later he had a chill, followed by pains in the bones, for which he took quinine; the submaxillary glands of that side began shortly to swell, and a little later the general eruption appeared, with which he presented himself.

When first seen there was on the left cheek, not far from the angle of the mouth, and about an inch from the angle of the jaw, an ulcerated surface, circular in shape, and about three-quarters of an inch in diameter, slightly raised, and with a raw, succulent surface, in which many hairs still stood, partly covered with a crust; the lymphatic glands beneath the jaw, on the left side, were as large as small almonds, and some smaller ones were felt in front of the neck. The entire body, head, and limbs were covered with a brownish-red, papulo-squamous syphilide of very characteristic appearance; the throat was very sore from abundant mucous patches.

The subsequent course of the disease was very distressing; the cutaneous lesions were very severe and prolonged; he had an intense choroiditis, and

at times active nervous symptoms, having once also a perfect locomotor ataxia; this latter yielded, as did other syphilitic phenomena, to active treatment, but for over two years, while under observation, he had as severe symptoms of syphilis as are often seen, rendering him helpless on several occasions. Six months after his first visit—that is, nine months after infection—it was recorded that the glands beneath the jaw were still swollen, and the mark of the chancre was still plainly visible on the left cheek.

Surgical sounds and specula are credited with having produced syphilitic inoculation, and in one particular instance, namely, Eustachian catheterization, this has been the source of repeated infection. No less than twenty-five different persons have reported one or more cases of this nature, and of these cases, about sixty were traced to the practice of a certain ear specialist in Paris. Some instances of this mode of infection have also been reported in this country.

Time does not permit of the further elaboration of this most interesting and important subject of the acquiring of syphilis by means other than venereal. But from this hasty, and by no means complete sketch of some of the recorded methods and instances of the communication of syphilis in the various walks and occupations of life, as also from the illustrations given, it is seen that the disease by no means deserves to be classed always as a venereal affection, nor are the sufferers from it always to be looked upon as guilty of sexual transgressions; syphilis occupies an important place, not only pathologically, in the great mass of diseases affecting the human race, but also practically as one which may at any time affect the most innocent and the least suspecting.

Syphilis has been found to attack the young and old alike, irrespective of age or condition, and in all the many instances or classes alluded to, quite independently of any venereal act or possibility. As each new case or series of cases comes to light, it becomes more and more probable that the number of instances in which syphilitic infection has thus innocently occurred is much greater than is commonly imagined. The total number of innocent victims actually mentioned in connection with about one hundred and fifty epidemics, large and small, of *syphilis insontium*, amounts to some thousands, while thousands of separate cases of extra-genital chancre are also found scattered through literature.

When we consider the immense numbers of syphilitic patients seen every year in the public clinics of the world, most of them living without any restraint upon their actions, even during the most contagious period of the disease, it can readily be understood that the liability for others to contract the disease innocently is by no means slight. With a poison so

freely secreted from mucous lesions, and so virulent, and capable of being transported and introduced in so many different ways, and, as far as is known, endowed with the possibility of being preserved for an indefinite period, the only wonder is that cases of non-venereal communication of syphilis are not even more frequent than they are now known to be.

The subject of the prevention of syphilis is, therefore, surely one which calls for serious attention, and one which claims the best thought, both of the profession and of the community.

4 EAST THIRTY-SEVENTH ST., NEW YORK.

MEDICAL PROGRESS.

Treatment of Scabies.—DR. JAMES C. WHITE, of Boston, in a paper recently read before the Boston Society for Medical Improvement, advocates the following method of treatment which he states is applicable in every case, however extensive or severe the accompanying inflammatory processes may be. He prefers a mixture of the three active agents and combines them in this way:

R.—Sulph. flor.	. . . . .	3ij.
β-naphthol	. . . . .	3j.
Balsam of Peru	. . . . .	aa 3j.—M.
Vaseline	}	

This quantity is generally sufficient for a single case. The patient is directed to rub a third of this mixture into the whole surface of the body, from the neck downward at bedtime. He is especially told to rub it between the fingers and upon the penis, and that it must be applied to the back by some other person. He is to sleep in old garments, that the bedclothes may not be soiled. In the morning the skin is to be thoroughly washed with soap and water. The use of the bath in this class of patients is of course out of the question, nor is it essential. The ointment is to be used in this way for three consecutive nights. Generally the itching ceases almost wholly on the first application. The patient is also told not to use it after the third night, unless, after waiting two more nights, there should be a decided return of the pruritus here or there, in which case the salve is to be rubbed into such parts only, and only for two nights running. For very young children he omits the naphthol in prescribing the ointment, on account of its occasional irritating properties.

In cases where the accompanying eczema is severe, it is well to require an inspection of the patient again on the sixth or seventh day, when it will sometimes be found necessary to direct a course of treatment addressed to this residuary condition. A very frequent mistake on the part of the physician or patient at this stage is the conclusion that the appearances, or accompanying itching, are signs of the continued activity of the original affection, and the consequent renewal of the use of the stimulating parasiticide, which only aggravates the existing process. He has often seen cases of post-scabetic eczema in dispensary and private practice, which have been kept going for months by such errors of judgment. It must also be remembered that in prolonged cases of itch the cutaneous nerves have acquired, as it were, the habit of demanding to be scratched, and seem to require

it for a long time after every visible sign of the disease has disappeared, and these cases of surviving pruritus are often mistaken for remaining evidence of the original affection, and mistreated accordingly.

Directions are always given that on the first night of the treatment all the clothes which have been worn next the skin—shirts, drawers, and socks, and the sheets and pillowcases last slept in—shall be thoroughly boiled before being used again. Gloves should be baked or destroyed.—*Boston Medical and Surgical Journal*, February 14, 1889.

Thymol in the Treatment of Diabetes.—DR. BUFALINI (*Annale Universali di Med. and Rev. Soc. Med.*, No. 31, 1888) states that thymol, which by some has been highly praised as a remedial agent for diabetes, while others claim that it is dangerous, has, in his hands, exerted absolutely no influence on the course of glycosuria and diabetes. Only in two cases of acetonemic diabetes did he obtain, during, as well as shortly after, the administration of thymol, an amelioration in the acetonemic phenomena, namely diminution of the odor of the breath, of the quantity of acetone in the urine, and a general improvement in the patient's condition.—*Journal de Méd. de Paris*, February 3, 1889.

Creolin Pills.—

R.—Creolin	12 parts.
Alcohol, dilut.	2 "
Powdered tragacanth	2 "
Extract of liquorice	} aa 24 "—M.
Powdered liquorice root	

Make 200 pills.

Sig.—Take two pills, two or three times daily, in decomposition of the intestinal contents, especially during infectious diseases.—*Berliner klin. Wochenschrift*, February 4, 1889.

A Case of Reinfection with Syphilis.—The case is recorded in the *Giornale delle Mal. Ven.*, of a woman aged forty-six, who had contracted syphilis when a child from a schoolfellow. She suffered very severely at the time, and had the characteristic eruptions, tibial pains, sore throat, and subsequent abortions. Ten years later she had well-marked tertiary manifestations, which gained for her the soubriquet of *fistolosa*, in her village. While she was still in the same deplorable condition she was reinfected by her husband, who had a chancre on the penis and was covered with a roseolar eruption. She came to the hospital, and was found to have a typical indurated chancre on the labium, with corresponding glandular enlargement, and a confluent rose-colored papular eruption all over the body. She also complained of general malaise and pain in the shoulders and knees. These symptoms promptly yielded to treatment, and there would not seem to be any reason to doubt the accuracy of the diagnosis in both instances. Indeed, that exceptions should exist in the protection afforded by a prior attack of syphilis, is only what a study of other specific diseases would lead one to expect.—*Medical Press*, Feb. 6, 1889.

The Microbe of Diphtheria.—M. ROUX, sub-director of the laboratory at the Pasteur Institute, in conjunction with M. Versin, has succeeded in isolating the generating

microbe of diphtheria. They have studied the conditions in which this microbe is developed; and have succeeded in reproducing diphtheritic infection in rabbits, pigeons, fowls, and guinea-pigs. Pushing their experiments further, they have also isolated the poison secreted by the microbe from which are derived all the asphyctic and paralytic symptoms of croup or diphtheria; and it is foreseen that the time is not far distant when prophylaxis by means of inoculation will be established. This discovery will certainly be a great boon, since diphtheria is one of the most cruel maladies which afflict humanity. In the note on this subject by M. Roux, the author further states that all the experiments on animals tend to prove that the microbe of diphtheria develops only on mucous membranes already diseased, and it is probable that this is most frequently the case in man. Hence diphtheria is particularly frequent after an attack of measles and scarlet fever. Hence also a simple sore throat occurring in these maladies should never be neglected; frequent washings of the mouth and throat of children affected with these two diseases, should be practised with solutions of carbolic acid. Even in confirmed diphtheria, carbolic acid seems to be the most efficacious antiseptic.—*Lancet*, February 9, 1889.

The Local Treatment of Laryngeal Phthisis.—DR. A. SOKOLOWSKI, of Warsaw, concludes an exhaustive article on the treatment of laryngeal phthisis, with the following summary:

1. A cure of laryngeal phthisis, though seldom effected, is possible.
2. Cicatrization of each ulcer which takes place by itself, or through local application, is closely related to the general condition and the character of the local changes in the lungs.
3. The best local results are obtained from the combined treatment by lactic acid, surgical procedures, and the galvano-cautery.
4. General treatment should go hand in hand with the local treatment.—*Wiener klin. Wochenschrift*, January 31, 1889.

Salicylate of Cresol.—At a meeting of the Academy of Sciences PROF. BOUCHARD read a note for Dr. Letzinski, of Berne, on the salicylate of cresol, which is not soluble, and which is a powerful antiseptic. This medicament has, according to the author, given good results in acute rheumatism. As it is possible to saturate the intestines without inconvenience, and as the microbe of cholera appears to have its principal habitat in the intestines, Dr. Letzinski thinks that this substance may be employed with success in the prodromic period of the choleraic attack. M. Bouchard, however, makes some reserve on this last point, for he does not participate in the opinion of those who hope to cure cholera with antiseptics introduced into the intestines.—*Lancet*, February 9, 1889.

Nature and Treatment of Diabetic Coma.—DR. STADELMANN, of Dorpat, in a recent article in the *St. Petersburgische Wochenschrift*, points out the great similarity which seems to exist between the coma of diabetes and the condition produced in herbivorous animals by inducing acid intoxication. Amongst other points, he refers to some analyses by Minkowski, of the gaseous contents of the blood. In the normal condition, the blood of the

rabbit contains 25 per cent. of carbonic acid; but when the animal is suffering from artificially induced acid intoxication, the carbonic acid is diminished. Thus, in one instance, Minkowski found it 16.4 per cent. with a moderate degree of intoxication; when the latter was increased, the percentage of carbonic acid fell further, first to 8.8, and finally to 2.9 per cent. In order to compare this with the gaseous changes in the blood of diabetics, he examined the blood of a patient before and during coma, the carbonic acid being respectively 17 and 3.34 per cent. In order to ascertain whether this diminution of the carbonic acid in the blood was merely due to coma as such without reference to its cause, he examined the blood of a comatose patient, not a diabetic, whose condition was due to meningitis. Here the carbonic acid amounted to 28.2 per cent. The acid existing in diabetes appears to be oxybutyric acid, which in some cases appears in the urine to the extent of something like three ounces per diem. Some years ago Dr. Stadelmann found a new acid, which he believed to be crotonic acid, in considerable quantity in certain cases. He now, however, considers it merely a substitution-product from oxybutyric acid.

The indications for treatment supplied by these views are, of course, to combat the acid by large quantities of alkali. Several attempts have been made to treat diabetic coma by injecting into the veins from one to four ounces of carbonate of soda dissolved in about four pints of water, with a little chloride of sodium. In only one instance, however, has this proved successful, and unless it is done very early no good result can be fairly expected of it. It is found that the urine in twelve hours after the injection is intensely acid. Better results are to be obtained in attempting to ward off coma by giving alkalis freely. Thus, Dr. Stadelmann prescribes about an ounce of tartrate or citrate of soda dissolved in about half a pint of soda-water two or three times a day, and has found great reason to be satisfied with this line of treatment. Of course, if coma should come on, he would have recourse to alkaline intravenous injections without loss of time.—*Lancet*, Feb. 9, 1889.

Treatment of Minute Nodules of Lupus.—DR. UNNA (*Monatshefte für prakt. Dermatology*, No. 19, 1888) bores out each nodule, after the mass of deposit has been got rid of, with a 10 per cent. sublimate point, then dresses the part till healed, with the following ointment suggested by Dr. Brooks:

R.—Salicylic acid	20 parts.
Creasote	40 "
Simple ointment	40 "

—*Edinburgh Med. Journal*, Feb. 1889.

Action of Sulphonal.—DR. RUSCHEWEYH-JEVA reports in the *Neurologischen Centralblatt*, No. 21, 1888, the following results obtained with sulphonal: of 212 administrations given at the psychiatric clinic its action proved fruitless in only twenty-four, or 11 per cent. Until recourse was had to Dr. Kast's latest method of administration (mixing the drug with one pint of milk or hot bouillon and taking it at supper time) the results were still less favorable. The mixture thus being rendered intensely bitter, one can, should the same hinder digestion, add to it a few drops of hydrochloric acid. If the

hypnotic was prompt in its action, the consequent lassitude generally observed on the following day was not noticeable and yet in most cases sleep was obtained the following evening without any of the drug having been taken. The author explains this circumstance by the fact that sulphonal circulates in the blood for twenty-four hours and is thus enabled to still exert its physiological action the second evening. Only in the very excited paralytics was daily administration necessary. Excellent results were obtained from its administration in the case of a morphine-eater, a female, as well as of two syphilitics who suffered from insomnia caused by the pain consequent on calomel injections.—*Deutsche med. Wochenschrift*, Jan. 31, 1889.

Artificial Maturation of Cataract.—DR. PARISOTTI, of Rome, in a lecture published in the *Riforma Medica*, describes two cases in which success appeared to follow attempts to induce artificial maturation of cataract by a procedure differing somewhat from the operations proposed by other ophthalmologists for this purpose. Having produced local anesthesia by means of cocaine, and having washed the eye with an antiseptic solution containing corrosive sublimate, Dr. Parisotti makes an incision in the upper part of the sclero-corneal border, about six millimetres in length; the pupil is then dilated by atropine, and, the aqueous humor having been let out, rather energetic massage is applied to the cornea for about a minute. The antiseptic lotion is again applied, and a bandage kept on for three days. In two or three weeks considerable progress is to be observed in the maturation.—*Lancet*, February 9, 1889.

Salol in Cholera.—DR. W. LOEWENTHAL, at a meeting of the Académie des Sciences, stated that he had conducted a number of micro-biological experiments, the results of which led him to conclude that the bacillus of cholera only develops toxic properties when it comes in contact with the pancreatic secretion. Guided by this he searched for a drug, which would be harmless to the human economy and still prevent the development of the cholera bacillus in the pancreatic fluid. Salol he believes to have this power, since, in the presence of fresh pancreatic fluid, it destroys cultures of cholera bacillus and if first mixed with the culture material (generally gelatine) renders this material sterile.

To prove that the drug itself was perfectly harmless, the author himself took at ten o'clock one morning seventy-five grains, and the same evening at seven o'clock, seventy-five grains more. The morning dose, which he took fasting, produced no ill effect save a passing vertigo, while the evening dose produced no symptoms whatsoever. The urine became somewhat darker and remained so for forty-eight hours from the time of the ingestion of the second dose.

Until further clinical investigations have shed more light on the matter, the author proposes that this drug should be used as follows:

As a prophylactic: three times daily after the principal meals, thirty grains each time.

As a therapeutic agent: sixty grains to be taken when the first symptom of cholera shows itself and then fifteen grains every hour.

As much as five drachms may be administered daily.—*Revue de Thérapeutique*, Feb. 1, 1889.

Treatment of Psoriasis.—

R.—Pyrogallie acid }
 Chrysophanic acid } aa 3j
 Ether and spirit, q. s. to liquefy.
 Collodion } 3iij.—M.

Paint on the diseased surface every three days, after a bath.—*Medical Press*, February 6, 1889.

Diabetes and Tumors.—DR. TUFFIER has recently published a monograph on this somewhat important subject in the *Archives Générales de Médecine*. The coincidence of diabetes and neoplasms, only noted hitherto in a few scattered publications, and entirely overlooked in standard text-books, does not appear to be rare. This coincidence is not surprising to the author. He accepts M. Verneuil's bold theory that both tumors and diabetes are related to the arthritic diathesis. Already almost every form of tumor has been observed in diabetic patients. Almost every form of diabetes has been found to attack persons already the subjects of tumor. As a rule, the constitutional disease comes first; the patient is diabetic already before the tumor makes its appearance. Malignant tumors, as a rule, advance without causing much pain, and somewhat slowly in these cases, but they proceed more rapidly than the diabetic symptoms. They are apt to be taken for innocent growths. The complication in question is very serious in respect to operative interference, as we all know. No surgeon should think of removing small, innocent tumors which are causing no trouble.

Dr. Tuffier describes two instructive cases. In the first, death occurred forty hours after the removal of a small parotid tumor. The fact that the patient was diabetic had been overlooked. This was also the case in the second example of the dangers of operation under the circumstances. "A little hypertrophic tumor of the skin of the cheek" was removed at the patient's request. Phlegmonous erysipelas, followed by sloughing, set in and killed the patient within five days. Urgent operations must, Dr. Tuffier asserts, be undertaken with great caution. The safer are preferable to the most thorough, in his opinion. When an operation appears absolutely necessary, but not urgent, it is important to spend some time in reducing the diabetic symptoms by medical treatment. Should, however, all the sugar and polyuria disappear, the surgeon must still never overlook the nature of the patient's diathesis. Under the most favorable circumstances, in any case of that kind, deep operations and prolonged dissections, free division of vessels, and the formation of large flaps are to be avoided. The slow progress of tumors and the little pain which they produce are important facts, according to Dr. Tuffier. He has found that malignant tumors lie almost latent in diabetic subjects for a long period. Removal of a similar growth from a healthy subject would hardly insure him against so long an interval of time before recurrence. When an operation is thought advisable, the thermo-cautery is preferable to the knife. No attempt to insure union by first intention should be made if it involves the slightest traction on skin-flaps. The wound must be laid open, but dressed with extreme antiseptic precautions.—*British Medical Journal*, February 16, 1889.

Cocaine Poisoning.—Since the introduction of cocaine into the practice of medicine, so many cases of poison-

ing have occurred that it is important to analyze these for future guidance. It is the fate of nearly every useful but powerful drug, before its complete action is recognized, to be either too extensively or too recklessly employed. Perhaps this has been the case with cocaine, because it is commonly used for its local anæsthetic effect—to alleviate local burning, tenderness or pain—and for its anæsthetic effect prior to the extraction of teeth or other minor operations. Although these local uses are the chief ones for which cocaine is employed, yet it is important to bear in mind that it is a very powerful poison. When simply painted on to the parts serious results do not often ensue, except when applied to the pharynx or larynx in the form of spray. A tendency to syncope and complete unconsciousness may follow its use in this way. When injected under the gums for the extraction of teeth, or under the skin for the removal of a tumor or the opening of an abscess, great care is necessary in graduating the dosage, a fact by no means generally recognized. And this fact becomes all the more important when it is remembered that there is very great idiosyncrasy in the action of cocaine. A number of trials were made with cocaine by Decker, with the view of lessening the pain caused by hypodermatic injections of calomel; and he found that a dose of 0.05 gramme (three-quarters of a grain) ought never to be exceeded in a hypodermatic injection, and that usually half that amount, three-eighths of a grain, was safe to administer. This does not mean that a dose larger than three-quarters of a grain cannot be administered with impunity; but it is impossible to predict that a larger dose will not cause serious symptoms of poisoning.

Besides its action as a local anæsthetic, cocaine is a stimulant to the central nervous system first, and finally a paralyzer. It increases the respirations, and causes death either by respiratory paralysis, or more commonly, according to Mosso, by a tetanus of the respiratory muscles. Cocaine, moreover, paralyzes the vagus, causing extreme rapidity of the heart's beats; it raises the arterial blood-pressure, and increases the intestinal movements. It diminishes also the secretion of sweat and of saliva, and causes a considerable rise of body temperature. According to Mosso, cocaine is one of the most energetic substances known in causing an increase of the temperature.

In many of its actions, therefore, cocaine resembles atropine; in dilating the pupil, in stimulating the central nervous system, and finally paralyzing it; in paralyzing the vagus, in diminishing the secretions, and in increasing the intestinal movements. It differs from atropine in producing a contraction of the peripheral bloodvessels, while the primary contraction caused by atropine rapidly passes into dilatation. From this epitome of the physiological action of the alkaloid, the symptoms of poisoning in man are readily understood.

The question whether in a given case a drug will produce symptoms of poisoning or not depends chiefly on the dose given, but also on the mode of administration, and on the rapidity of elimination. Cocaine given hypodermatically is rapidly absorbed; it is also, in the healthy individual, rapidly eliminated by the kidneys. If, however, there is extensive disease of these organs, elimination will be prevented to a greater or less extent, and the symptoms of poisoning will be more serious. In a

recent case, in which twenty-two grains were accidentally administered by the mouth, the patient, a man, died almost immediately. At the post-mortem examination it was found that one kidney was tuberculous and the other was not functional owing to advanced atrophy, a condition of organs which would certainly prevent the rapid elimination of the alkaloid.

The slow elimination in other persons may explain some of the cases in which cocaine has caused poisoning. Mowat relates the case of a man, aged twenty-nine, in whom one drop and a half of a ten per cent. solution was injected at the sides of a rodent ulcer of the eyelid, previous to operation. The dose was only about one-seventh of a grain, but as the wound was being sewn up the patient became pale, and gasped for breath, while his legs were stiff and cold. The pupils were half dilated, and reacted to light; the pulse was weak and very frequent. The knee-reflex was exaggerated, and clonic spasms of short duration supervened. When these had ceased the patient appeared drunk, and, on recovery, was 'giddy for some time. It is unusual to observe such serious symptoms of poisoning from so small a dose. The great vascularity of the eyelid may have aided the rapid absorption of the poison. Poisoning, however, by larger doses is by no means uncommon. A dentist, for example, injected into the gums of a girl, aged nineteen, one grain and a third (0.1125 gramme) of cocaine in two portions. Anæsthesia was complete in a few minutes, and the tooth was extracted with ease. After washing out the mouth once or twice, the patient became very pale and fell into convulsions. Nitrite of amyl and cold affusions were tried, but had no effect in restoring the patient. She became unconscious and groaned, while the clonic spasms in the muscles of the body and extremities lasted for five hours. The pupils were dilated and did not react to light. At first the pulse at the wrist could not be counted, but afterward it was 176 in the minute. The temperature was raised, being 38.2° C. (100.8° F.), and the respirations were 44. The unconsciousness lasted two hours after the spasms had ceased. The patient recovered consciousness in seven hours, but was then unable to use the extremities. There was well-marked photophobia, diminished sensation in the hands, anæsthesia of the mucous membranes of the nose and mouth, and loss of smell and taste. The pulse was now 132, and the respirations 28 in the minute. Gradual recovery took place, but there was pain in the region of the heart for six days. During the first twenty-four hours after the cocaine had been given there was diminution of the amount of urine; there was also sleeplessness for thirty hours, and complete loss of appetite for four days. The patient was treated with large doses of opium, but no appreciable effect was observed.

In another case, where one grain and a quarter was injected for an acute attack of sciatica, there were soon great uneasiness and excitement, with a lively but constantly changing expression of countenance. There were choreic gesticulations with the hands; the pupils were irregular, the pulse very frequent, and the breathing rapid. Opium given in small doses was not of much benefit to the patient. Recovery did not ensue till four days after the poisoning, and even then the patient was restless and had a tendency to giddiness.

In a third case, a boy aged thirteen years received

about one grain and a half at the side of a sebaceous cyst which was about to be excised; twenty-five minims of a solution of two grains in thirty-five minims of water were actually given. In five minutes the patient became pale and restless, so that the operation was rapidly performed. Dyspnoea ensued, and the pulse-rate rose to 120, while the restlessness increased, and the patient wrung his hands. The heart's action was very much disturbed, the pulse becoming so rapid as scarcely to be felt at the wrist; the respirations were frequent and irregular. In three-quarters of an hour there was nausea, with eructations and pain in the epigastrium. Brandy was administered, and the epigastrium rubbed. In four hours the patient was quite well. It was noticed that at the time of the operation the anæsthesia was not complete.

It is evident from these cases that any dose above one grain, whether injected into the gums or under the skin, may give rise to serious symptoms, happily, however, not fatal. The case of poisoning with one-seventh of a grain mentioned above was undoubtedly due to some idiosyncrasy on the part of the patient; the other cases of poisoning with doses above a grain tend to confirm Decker's statement that no dose over three-quarters of a grain ought to be administered hypodermatically. Indeed, it is not as a rule necessary to use a larger dose than this; if judiciously directed, the injection may be so made that complete anæsthesia will be obtained over a large area with even half a grain. The object is to obtain local anæsthesia without producing any of the general physiological actions of the alkaloid. In some cases the advent of poisonous symptoms seems unavoidable, and the question arises, What is to be done?

Morphine is to some extent an antagonist to cocaine, as it is to atropine; but no beneficial results appear to follow the administration of opium or morphine in cocaine-poisoning, even in large doses. Nitrite of amyl has been recommended as an antidote; it dilates the peripheral vessels, while cocaine contracts them. In cases of poisoning, however, it does not appear to have been of much use. The chief symptoms in severe cocaine-poisoning are referable to the nervous system; these are unconsciousness and convulsions. The latter, which are clonic in character, are cerebral in origin, since they are not produced in animals if the spinal cord be divided. However, death occurs either from respiratory paralysis, or perhaps more frequently from tetanus of the respiratory muscles. Cocaine, in fact, acts upon the central nervous system from above downward; it first affects the cerebral hemispheres, then the medulla oblongata, and finally the spinal cord. Chloral hydrate antagonizes all the actions of cocaine, except the rise of temperature. Although chloral itself produces a great fall of body temperature, it does not counteract the rise produced by cocaine. In poisoning by this alkaloid, Mosso, as the result of numerous experiments, advises the inhalation of ether or chloroform; in this way death by respiratory tetanus is prevented. When the patient is recovering somewhat, chloral in small doses may be administered. But prevention is better than cure; and there is no doubt that as great care ought to be taken in using cocaine for its local anæsthetic effect as in the exhibition of any other powerful drug, and especially is this the case when it is injected hypodermatically.—*British Med. Journal*, Feb. 9, 1889.

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SATURDAY, MARCH 9, 1889.

ERADICATION OF TUBERCULOUS DISEASE OF THE HIP-JOINT.

GRADUALLY the evolving knowledge of joint disease and its pathology is being further elaborated into special applications and techniques for each individual joint. Heretofore the knee has had devoted to it a great amount of study and literature, but at present the hip is pressing more to the front—the operative treatment of the former having reached a high state of perfection.

An ideal result in the treatment of tuberculous disease of the hip-joint which has reached a stage justifying operation would be to open the joint, remove every particle of neoplasm, and secure primary union without drainage, with perhaps preservation of fair function of the articulation.

Such result MR. BARKER, *Lancet*, January 19, 1889, would seem to have attained in a series of cases by adherence to a technique which he describes, and by means of which he is confident of equally good results in a large proportion of all cases—more especially when, made bold by the assurance of good results, we may feel justified in operating at so early a time in the course of disease as we could desire. For realization of this are necessary: most rigid and perfect asepsis, complete exposure of the joint cavity and eradication of every particle of tuberculous material therefrom, together with avoidance of manipulation, and subsequent protection from infection.

Before incision the joint surroundings and every-

thing liable to come in contact with it are made scientifically clean. After incision no antiseptics are used: nothing but an abundance of hot sterilized water, except just before closure of the wound it is to be mopped out with antiseptic solution and a little iodoform sprinkled over its surfaces. The incision used by Barker is that which was proposed by Heuter, of Greifswald, in 1878, which incision we think likely to become the accepted one for exploration or excision of the joint in question. It commences upon the front of the thigh half an inch below the anterior superior spine of the ilium and continues downward and a little inward for a distance of about three inches. In following this line the knife sinks between the tensor vagina femoris and glutei muscles on the outside and the rectus and sartorius upon the inner side; thus readily gaining ample access to the capsule without dividing any muscular fibres or other important structures. The joint opened and all purulent material washed away by a powerful stream of hot water, the neck of the femur is divided with a narrow-bladed saw in the direction of the cutaneous incision, and the head of the bone lifted out. Now begins the really vital part of the operation—the eradication of all remaining tuberculous material. The whole joint cavity is most thoroughly scraped or gouged out with what the author calls “flushing gouges.” These Mr. Barker has invented for the purpose, although applicable to an infinitude of other uses and destined to become most valuable implements: consisting of the usual spoon gouge or curette mounted upon a long hollow handle having connection with a large elevated can of hot water by means of rubber tubing.¹ As soon as diseased tissues are cut away by the curette they are immediately flushed out and carried away by the powerful stream of water at all times rushing through the instrument.

It now simply remains to mop out the cavity with some powerful antiseptic, to sponge it dry and to dust lightly over the exposed surfaces a little crystalline iodoform, and to suture the wound edges firmly in contact without provision for drainage. Over this is placed a large antiseptic dressing so bandaged as to make uniform firm pressure upon all parts surrounding the wound, and the limb is abducted and placed upon a Thomas' splint. Theoretically a “cavity” remains, but practically it will be found that the wound surfaces are all in contact upon completion of the dressing. The dressing is to remain

¹ These irrigation curettes have been independently invented described and used by Auvar (Archives de Tocologie, No. 10, 1888).

on until the wound heals (which it should do in a very few days if we are to be successful); the splint for about three months, when the patient should be let run about without appliance.

A case is cited by Barker where a boy æt. five had developed abscess and other serious hip-joint disease in spite of a year's treatment upon a Thomas' splint. He excised the femoral head as above, secured primary firm union in ten days, and had the lad running about within as many weeks. At the time of writing his paper (six months after operation) the boy had no sign of disease about the joint, some motion, and but an inch of shortening.

If these brilliant results are as easy of attainment to all as they have been to Mr. Barker and his colleagues, verily a new era in the surgery of the hip-joint is at hand.

STATE REGULATION OF MEDICAL PRACTICE.

THERE appear to be a general repugnance to, and suspicion of, "mixed boards" for the regulation of medical practice, as a result of compromise legislation by the different States; yet it must be admitted that they do not always work badly. It is even claimed, in the instance of the Illinois board, that its efficiency has not been diminished, but rather enhanced by the commingling of regulars with irregulars in the administration of the medical-practice act; in that board there are not only a homœopathist and an eclectic practitioner, but also two laymen.

No one at all familiar with the achievements of this board will refuse to acknowledge that it has done much for the purification of medical practice in Illinois, in the face of very serious obstacles and of an exceptionally strong body of empirics. So many quacks were driven out of Illinois into adjoining territory that other legislatures have been impelled in self-defence to adopt similar laws, and there is very good reason for believing that the country at large has reaped this benefit, that the adoption of quackish practice as a means of livelihood has been discouraged, and that the proportion of "unqualified" practitioners is lower than at any former period of our history. Add to this the fact that in these States the standard of qualifications is not stationary, but is constantly, though gradually rising; and, as a result, the percentage of rejections by the colleges is rising also. The inferior class of students will find it more and more difficult to

stand the tests, and will be forced to select other pursuits in life than that of medicine.

In Illinois, after two more years, a further advance has been provided for in the addition of a fourth year of professional study to the three that are at present required. A medical college "in good standing" will then be defined as one that requires four years of study under a preceptor and an attendance upon three full courses of college instruction as conditions of graduation. This new order of affairs will take effect after the close of the college session of 1890-91, and many of the schools are already so framing their curriculum that their graduates may be able to conform to the prospective standard raised by the "mixed board" of the Prairie State.

At the meeting of the Trustees of the University of Pennsylvania, held last Tuesday, the following appointments were made: Dr. De Forest Willard, Clinical Professor of Orthopædic Surgery; Dr. George A. Piersol, Professor of Histology and Embryology; and Dr. Samuel G. Dixon, Professor of Hygiene.

It is reported that the Trustees have under serious consideration the advisability of adding in the near future a compulsory fourth year to the medical curriculum.

It is stated that Mr. Henry C. Lea has given \$25,000 to the Laboratory of Hygiene of the University of Pennsylvania on condition that an equal amount be obtained from other sources, and that a goodly proportion of this additional sum has been already raised.

The lectures on hygiene and laboratory work next year will be obligatory upon the first year's students at the University.

PRESIDENT GILMAN, in his address on Commemoration Day (February 22) at Johns Hopkins University, said that if \$100,000 were added to the accumulated income remaining in the hands of the Trustees, that the University for the ensuing three years would not be hampered in its resources. More than half this sum has already been definitely pledged.

ACCORDING to the *New York Medical Journal*, at a special meeting of the Medical Faculty of Harvard University, held on February 23d, it was announced that Dr. Henry F. Sears had offered to present the school with \$40,000, for the purpose of erecting a

pathological and a bacteriological laboratory. The matter was referred to a special committee. The plan proposed is to build a two-story annex to the present building, one story to be devoted to pathology, and the other to bacteriology, and to fit up a gymnasium for the students in the basement.

A BUILDING site of 75 feet by 100 feet, with the privilege of an additional 25 feet, it is stated, has been secured on West Forty-third Street, near Fifth Avenue, for the new building of the New York Academy of Medicine.

WITH the wish to promote research in certain departments of physiology, and to aid in defraying its cost, a member of the American Physiological Society has offered two hundred dollars for the best research or researches bearing on one or more of the subjects stated below, viz.:

"The rate of transmission of nerve impulses, afferent and efferent, and the duration of reflex and reaction time in the higher animals, especially man; also the conditions, normal and pathological, which alter such rates and times."

The competition is limited to residents of North America, and the prize will be awarded for original work done after January 1, 1889. The award will be made by those persons who, on October 1, 1890, constitute the Council of the American Physiological Society. In making its award, the Council will take into consideration researches of which printed or legibly written accounts, marked on the outside "Nerve Physiology Prize," have been received by the then Secretary of the Society before October 1, 1890.

To obtain the prize, a research must have a direct bearing on human physiology, and good researches on man will be preferred to similar researches on other animals; but experiments on mammals other than man, if applied to the interpretation of the phenomena of the human body and supplemented by observations on man, will have weight. Previous publication will not debar a research from the competition, provided the work has been done after January 1, 1889.

The Council reserves the following rights: to withhold the prize if, in its opinion, no research presented is sufficiently worthy; to award only a part of the prize if, in its belief, a research, though meritorious, does not deserve the whole; to divide the prize between two or more candidates in ratios

which seem to it just; and if it think it desirable, to require a competitor to demonstrate his experiments to a committee appointed by the Council.

For the present, communications concerning the prize should be addressed to H. Newell Martin, Secretary, Johns Hopkins University, Baltimore, Md.

The Eighteenth Congress of German Surgeons will be held at Berlin on April 24 to 27. Professor von Esmarch will open a discussion on the etiology and diagnosis of carcinoma, especially that of the tongue and lips. An effort will be made to collect the statistics of cases of carcinoma of the tongue, intestine, and stomach, in which more than three years have elapsed since the first operation and in which there has been no recurrence of the disease.

By the will of the late Alexander Murray, of Montreal, the General Hospital of that city will receive the sum of \$750,000. This is the largest gift hitherto made in Canada for any public charity, with the exception of the joint donation of Sir Donald A. Smith and Sir George Stephen of a million dollars for the founding of the Royal Victoria Hospital, also of Montreal.

DR. DAVID FERRIER has been appointed Professor of Neuro-pathology in King's College, London, and has resigned the Chair of Forensic Medicine in the same institution. It is stated that some provision will probably be made for supplying Dr. Ferrier with the means of carrying on pathological and physiological research in connection with this chair.

SOCIETY PROCEEDINGS.

PHILADELPHIA COUNTY MEDICAL SOCIETY.

Stated Meeting, February 13, 1889.

THE PRESIDENT, W. W. KEEN, M.D., IN THE CHAIR.

DR. W. W. KEEN read a preliminary report on a case of
TAPPING AND IRRIGATION OF THE VENTRICLES.

Last fall he made a proposition for tapping the lateral ventricles. At that time he was not aware that the procedure had ever before been suggested, but he has recently learned that, in 1881, Wernicke suggested it in a general way, and by the lateral route. He, however, first formulated general rules, which have stood the test of actual trial. The operation, he believed, was never performed until he did it in a case of marked choked disk on both sides, with complete blindness dating from last

Christmas, which he had the opportunity of seeing through the politeness of Dr. Strawbridge. He tapped the ventricle five weeks ago last Friday, reaching it by the lateral route, at a depth of one and three-fourths inches from the dura mater. A half-inch trephine opening was made, a crucial incision in the scalp and dura being employed, as he intended to keep up drainage. From two to four ounces of cerebro-spinal fluid escape from this opening daily.

The case was examined from day to day to see the effect on the swelling of the optic disks. Before the operation this amounted in one eye to 2.3 mm. and in the other to 1.8 mm. After the operation, it eventually fell to 0.83 mm. on each side. At the end of a week the horse-hair drain, which was introduced at the time of the operation, was substituted by a rubber drainage tube passing into the ventricle. The discharge then became freer, amounting from four to eight ounces per diem.

In addition to this, he explored with a probe the occipital lobe on the left side, twice to a depth of three and a half inches, but found no tumor. He then made a small opening by a gouge under the cerebellum on the left side, and explored the left lobe, and then passed obliquely into the right side, but no tumor was found.

On February 8th he trephined the child on the opposite side, thinking that there might be a tumor in the posterior lobe on that side, but he found none, though he touched the tentorium and the falx. He then tapped the lateral ventricle on that side. On February 12th he washed out the lateral ventricles, passing about eight ounces of a solution of boracic acid (four grains to the ounce) from one side to the other. There was some little irritation resulting from the manipulations, but the moment the warm solution began to pass through the ventricles the child settled itself into a position of complete comfort.

He exhibited a bottle of the cerebro-spinal fluid, which had been standing on his desk for a week. There were no signs of decomposition. The fluid contained both sugar and albumin. This, with its continuous flow, proves it to be cerebro-spinal fluid. The child did not suffer any notable rise of temperature after any of the operations, with the exception of the last one, when there was a temporary sharp rise to 104°.

CORRESPONDENCE.

THE MODUS FACIENDI OF THE PASTEUR METHOD AGAINST HYDROPHOBIA.

In a preceding article, on the inauguration of the Pasteur Institute, I gave a very superficial description of the different departments which, at present, constitute this institution. To-day I intend to examine more carefully one of the most important of these departments, the one which has attracted the attention of the scientific world for several years past, namely, the section devoted to the treatment of hydrophobia. Considering rapidly the statistics, I shall next give in as detailed a manner as possible, a full description of the method of preparation of the virus of different strengths employed, and the *modus faciendi* of the inoculations.

Very much has been said and written for and against M. Pasteur's method since the time he made his first communication to the Académie des Sciences, in October,

1885, when he presented the results of his first and successful inoculations performed on the young shepherd Meister, who had been most seriously bitten by an hydrophobic dog.

I shall not attempt to make a critical study of all that has been written against this method, as most of these articles, if carefully examined, show that their authors, even amongst Paris physicians, are nearly, if not entirely, ignorant of the practical application of the method, having never seen it applied, not having followed its results, not even knowing the kind of virus used for inoculations, for I have myself met several of these violent contradictors who were convinced that men were inoculated directly from the virus just obtained from the cerebrum of a dog which had just died from hydrophobia—which is far from being so.

Some have objected to the method, since a certain number of patients, who were inoculated to prevent the development of the disease, died anyhow. Is there a physician or a surgeon who can mention one single method of treatment which, applied to a particular disease, would give him a percentage of favorable results equal to 100 per cent.? I am afraid not. Others have gone so far as to say that the inoculations produced the disease. In no case has it been found, up to now, that such has been the case, and that one person should have died as a result of a previous course of inoculations. There is an experimental test to prove this fact, which I shall give further on, when the method of preparation of the virus shall have been described.

In this connection, however, I might mention this interesting fact, that most of those who are engaged in the experiments connected with the scientific researches of hydrophobia have inoculated themselves as a preventive against the danger which might arise from a manipulative wound—among these are M. Pasteur's able collaborators who have undergone these inoculations, and who, luckily for themselves and for the scientific world, have not had to regret it.

Let us now come to the statistics of the Institute, and compare the percentage of deaths by hydrophobia before and after the introduction of the new method.

The rate of mortality for ordinary bites or those made through clothing, was agreed in every country as varying from 10 to 20 per cent., while the percentage of deaths from bites involving the exposed parts, face and head, was recognized as being from 80 to 88 per cent.

The following are the statistics of the Pasteur Institute:

In 1886, 2682 persons were inoculated, with a death-rate of 1.34 per cent.

In 1887, 1778 persons were inoculated, with a death-rate of 1.12 per cent.

In 1888, first six months, 914 persons, with a mortality of 0.77 per cent.

These percentages contain even the cases of persons who died on the second day of the treatment, and it has been asserted by Dr. Gamaleia, of Odessa, and Professor Grancher, of Paris, that the treatment is of no avail if begun when the virus has already reached the nervous centres. Their assertion is founded on the following experiment: if one inoculates directly on the surface of the cerebrum of a healthy dog the nervous matter obtained from the cord of a rabid dog, although the virus is placed immediately in contact with the cerebral surface, the first symptoms of the disease will present them-

selves only from the fifteenth to the eighteenth day after inoculating. Admitting this to be the case in the human subject, and if we deduct from the above table all those who have died within fifteen days after the beginning of the treatment, the percentage comes down to

0.93 per cent.	. . . . .	in 1886.
0.67 per cent.	. . . . .	in 1887.
0.55 per cent.	. . . . .	in 1888.

An interesting and practical proof of the value of the method is illustrated by the following fact:

In Naples, from September, 1886, to January, 1888, 199 persons were inoculated, with a percentage of deaths of 1.58 per cent. In January, 1888, the municipality refused financial aid to the inoculating institution, which, therefore, was closed, and remained so until September, 1888. During this period of nine months, nine deaths occurred in non-inoculated persons from hydrophobia. The municipality then immediately asked the director of the institution to reopen it.

A medical journal of Vienna, the *Wiener medicinische Presse*, said in one of its articles that, contrary to what Professor Grancher had asserted in his speech, no anti-rabic institute existed in Vienna. This paper, however, is quite mistaken, for Dr. Uhlman, a physician who has occupied himself with this method in the Austrian capital, wrote to M. Pasteur, on November 19th, that from September, 1887, up to date, he had inoculated thirty-one persons, who all remained perfectly well.

Finally, what better proof of the success of the method can one give than to mention the following communication which was read lately before the Académie des Sciences, by a foreigner, a Russian, Dr. Odo Bujroid, from Warsaw?

"I began the antirabic treatment in Warsaw on June 29, 1886, a few days after my return from Paris, where I had studied the method under M. Pasteur from June, 1886, to January 1, 1887. I treated 104 persons bitten by rabid dogs, or suspected to be such. I admitted every person to the treatment, even those whose wounds were slight; I refused only those who had been recognized as having been bitten by healthy dogs. During these six months I applied the *simple treatment* of M. Pasteur, which treatment begins with the inoculation of the cord of fourteen days and finishes with the fifth day cord, only one inoculation a day being made.

"On November 23d I had my first case of death, a boy of eleven years, Arthur Stolay, bitten severely on the exposed right forearm; the treatment was only begun nine days after the bite.

"After this case of death, and influenced by the researches of M. Frisch, from Vienna, in regard to the application of the antirabic treatment, I determined to try a still weaker treatment, and I did not inoculate cords of less than six or seven days old. We know that these cords contain so little virus that Professor Frisch himself recognized them to be devoid of danger.

"As formerly, I admitted to treatment persons who had been lightly bitten, and refused only those who were recognized to have been bitten by healthy animals. During seven months I inoculated in that manner 193 persons, 5 of whom had been severely bitten in the face. As a result of this light treatment I had, notwithstanding the treatment, 8 cases of death by hydrophobia; amongst these were the 5 who had

been bitten at the face, and 3 bitten severely on the forearm.

"During the first days of August, 1887, two persons presented themselves who had been very severely bitten on the head and face by a wolf, whose hydrophobia had been experimentally demonstrated by inoculation in a rabbit. As I had observed that in cases of severe bite of the face, the light treatment was of no avail, I applied, for the first time, to these two patients a treatment which differs very little from M. Pasteur's *intensive treatment*.

"I made my inoculations with cords from twelve to three days old, performing these inoculations twice a day, and repeating the series three times.

"First day, morning, cord of twelve days; evening, cord of ten days.

"Second day, morning, cord of eight days; evening, cord of seven days.

"Third day, morning, cord of six days; evening, cord of five days.

"Fourth day, morning, cord of fourth day; evening, cord of three days.

"This series was repeated three times in twelve days.

"One month later I received two persons bitten still more severely by a female wolf, whose bulb had been inoculated in rabbits and produced hydrophobia. The treatment followed was the same as the preceding, but as the outside temperature was very high, and I found that the virulence of the cord is much reduced in hot days, I even inoculated in one case a two days' old cord. These four persons remained perfectly well, as is proven by the letters which I received from the Chief of the District of Chetm (government of Lulin, Russia).

"Since I began this intensive treatment, we have treated already *three hundred and seventy persons, thirty of whom were bitten in the face or head, with not one single case of death.*

"We begin our treatment always with the cord of ten days in summer and twelve days in winter, and complete it with the cord of two days in summer and three days in winter.

"Let me remark that in Warsaw we desiccate the cords at a temperature of 61° to 67° Fah., and in that manner they keep their virulence much more powerful than those which are preserved at 74° Fah., as is ordinarily done.

"Using the method just described, sixteen months have elapsed without one case of failure.

"Actually I make a very rigid choice of the bitten persons; I refuse to treat those who are bitten by animals who were little suspected to be suffering from hydrophobia, or whose clothes show no apparent sign of tear. In this manner I have refused to treat 160 persons, who naturally remained in perfect health.

"The 370 persons who form the last portion of my statistics, have been bitten by animals which were certainly suffering from hydrophobia, and which had inflicted very severe bites.

"In that same period of time which corresponds to my statistics, eight persons not treated have died from hydrophobia in Warsaw or its surrounding districts. This number represents only a part of the cases of hydrophobia non-treated, for it contains only the persons who presented themselves at the institute with the symptoms of the disease already present, and those of whose death we had been notified by persons bitten by the same animal and who had undergone the treatment.

"The application of the *intensive method* has not only proven itself to be devoid of danger, but also to be perfectly efficacious."

We shall take now into consideration the mode of preparation of the virus which is to be used for the antirabic treatment applied to the human subject. The inoculating virus is not derived, as is too often erroneously supposed, directly from the hydrophobic dog, and then injected directly into man; but the medulla of the mad dog is first inoculated in a rabbit; when this animal dies from the disease, another rabbit is inoculated with a portion of the spinal cord of this dead rabbit, and so on, the disease is allowed to pass through a long series of rabbits, until the moment has come when the time of incubation of the disease can be no more reduced, and that is, when the symptoms of hydrophobia make their invariable appearance on the seventh day, and the animal dies on the tenth from the paralytic form of the disease. Now is the time when the spinal cord of this rabbit is taken and prepared, as we shall describe further on, for the production of the virus for inoculations.

Passing next to the details of the manipulations. The first step is the removal or extraction of a certain amount of the nerve tissue from the brain of the hydrophobic dog. To accomplish this, the dog is placed on his abdomen, and, while an assistant steadies the head with a strong pair of forceps, the operator, after having removed the skin from the head, opens the skull with bone forceps. The brain and medulla are then carefully removed and placed on a previously sterilized plate, the lower surface of the brain directed upward.

We do not think it superfluous to recommend to the operator the utmost care while he is handling the anatomical pieces; in fact, his hands need never touch any of the brain during the extraction. The slightest abrasion on a hand or finger might be the starting-point of the inoculation of the disease. As I have already said, certain experimenters, to do away with the continuous fear of accidental inoculations during their experiments, have preferred to undergo a course of preventive inoculation.

For safety, it would be well to wrap the dead rabid animal in an antiseptic linen or paper, as is done at the Pasteur Institute; but *antiseptics must not* be used to render the instruments aseptic, or anything that comes in contact with the nerve matter, for fear of their neutralizing the condition of the tissues. Every instrument, every plate or bottle that is to receive nerve matter, must be sterilized by heat alone, and placed in a sterilizer for half an hour at a temperature of 248° to 266° F.

Returning to the brain of the dog, after it has been placed in the sterilized plate, the next step consists in exposing the floor of the fourth ventricle, from which situation a portion of nerve tissue the size of a pea is taken; to expose the floor the free portion of the medulla is seized with forceps, lifted and turned on the anterior portion of the brain, when the ventricle will be exposed. Two of these fragments are then taken in this situation and placed on a small glass which has been previously sterilized; veal broth is then added, drop by drop, while the operator with a glass rod triturates the small fragments into a pulp. This pulp is stirred continuously until two or three drachms of the broth have been used; two drachms if only two fragments of the size of a pea

have been used; three drachms if three fragments have been employed.

The veal broth is prepared by taking one kilogramme (two pounds eight ounces Troy weight) of veal, to which one litre (one quart) of water is added; the bones, tendons, and fat are first separated from the meat and thrown away; while the meat itself is cut into many small pieces. These pieces are then placed in the above-mentioned quantity of water, placed on a very small fire, and stirred continuously until it begins to boil. This broth is then carefully filtered on the ordinary filter paper, and is next placed into small bottles, the mouths of which are closed with cotton-wool. These bottles, with their contents, are next heated to a temperature of 248° F. for one-quarter to half an hour, when all the germs which they may contain have certainly been destroyed.

The virus, prepared as above described, is now ready for inoculation on the first rabbit; the operation is done as follows: The rabbit is fixed on a table, abdomen downward and legs extended on each side, and firmly fixed to the side of the table; he is placed in that position so that we may have easy access to the upper part of the head. Chloroform is now administered, and as soon as anaesthesia is obtained an assistant takes hold of the head of the animal to steady it, while the operator proceeds to the shaving of the operative field, and then makes an incision of three-quarters to one inch in length down to the bone, starting from the centre of an imaginary line uniting the two eyes and extending the incision therefrom upward. The lips of the wounds are then separated by means of hooks by the assistant, while the surgeon applies his trephine at about the middle of the incision. This opening must be at least one-third of an inch in diameter; the disk of bone is next removed, taking great care not to injure the brain membranes. The hypodermatic needle is next introduced through them, and two drops of the virus, prepared as above cited, are introduced after the needle is withdrawn. This external wound is washed carefully with a solution of carbolic acid, 1 in 40, and finally sutured.

The rabbit is then placed in a cage, which is kept very clean; the animal is kept under close watch. This rabbit will, in all probability, show signs of the disease after an incubation of fifteen days and die.

A portion or fragment of this dead rabbit's cord is then taken, prepared in a solution as mentioned above, and inoculated into the arachnoid space of another rabbit; when this newly inoculated one becomes rabid and dies of the disease, a portion of his nerve matter is again inoculated to another healthy rabbit; and so on, is the series continued, and it is found that after the twentieth to the twenty-fifth passage the rabbit shows invariably the signs of the disease on the eighth day. If the inoculation is continued to a still further series of rabbits, say to the fiftieth passage, it is found that the incubation of the disease is reduced to seven days and the animal dies on the tenth. This is the shortest inoculation obtained, for M. Pasteur, after having continued his inoculations to the one hundred and fiftieth passage, still found the incubation of the disease to remain at seven days.

The object of the inoculation of the virus of the rabid dog to the rabbit is not, as is often erroneously believed, to weaken the virus; on the contrary, the cultivation, so

to say, of the virus in the species rabbit, produces an increase in the virulence of the hydrophobia virus so far as one is able to judge by the first described series of experiments on rabbits, for we have seen that the direct inoculation of the virus derived from a hydrophobic dog shows itself in the rabbit after an incubation of fifteen days; while after the disease has passed through forty or fifty rabbits, the inoculation is reduced to seven days.

This increase of virulence is also observed in guinea-pigs, in which species the incubation even reaches five days. In certain other species, however, by a succession of passages from one animal of the same kind to the other, the time of incubation is progressively postponed and the virus therefore progressively attenuated. Monkeys belong to that class; a monkey inoculated with the virus obtained from a mad dog, takes the disease in eleven days, nerve matter taken from the medulla of this monkey inoculated to another monkey makes the disease appear in twenty-three days; and so on, the period of incubation is progressively postponed.

Having obtained, after this numerous succession of passages, a minimum time of incubation in rabbits of seven days, the seventh day rabbit's spinal cord, which by experiment has been shown to be virulent to the same degree throughout, is the one used for the preparation of the virus employed for human inoculation.

If a solution from this fresh cord should however be made, we would have the strongest, the most powerful solution of nerve matter, capable of giving the most severe form of hydrophobia, much worse probably than the one originated through a bite from a hydrophobic dog, as has been shown on lower animals.

The virulence of this cord for human inoculation must be graduated, and M. Pasteur has found that the desiccation of such a cord, by being suspended in a bottle containing caustic potash, can be realized to such a degree, that one can graduate the virulence of such a cord according to the number of days it has been exposed to the desiccating process, from its maximum intensity in the fresh state to its complete neutrality after a certain number of days of desiccation. Temperature slightly influences this process, for it has been found that the cord remains virulent longer in winter than it does in summer.

Returning, after this digression, to the rabbit dying on the tenth day after seven days' incubation, one must proceed to the extraction of the spinal cord. The animal is placed as before on the abdomen, the skin is cut open on the back and removed; the spinal canal is next exposed, by cutting alternately with forceps the spinal processes; when the cord is exposed it is to be freed from its attachment from below upward for about four or five inches, and is removed from the spinal canal.

This portion is then carefully placed on a sterilized plate, and to one end of it a sterilized thread is next attached, which is for the purpose of suspending the cord in the desiccating bottle.

The desiccating bottle holds about one-quarter, is broader than an ordinary wine bottle and has two openings, one at the upper part, the other below and laterally; the object of these two openings is to allow the passage of a draught of air; each one of these openings is kept closed by cotton-wool, as used in

bacteriology for closing the test or culture tubes. At the lowest part of the bottle, small fragments of caustic potash are placed, for the purpose of keeping the air absolutely dry. The cord is then introduced by the superior opening, and by its suspending thread is fixed to the sides of the neck of the bottle, while the opening is immediately closed with cotton-wool.

To make the first inoculation in man, the fresh cord is introduced into one of the desiccating bottles and left in it *fourteen* days, after which time it is found to be almost completely dried up, of a blackish appearance, brittle, etc.

Let us suppose that six persons who have been bitten present themselves on the same day for treatment. They will all receive on that first day a solution of a cord which has been desiccated for fourteen days; this is called the "fourteen days' cord." Having six persons to treat, we shall detach about six millimetres in length (one-quarter of an inch) of this fourteen days' cord, and allow it to fall in a small conical sterilized glass. We next, with a sterilized glass rod, triturate this cord and add drop by drop our veal broth, until we obtain a little more than six cubic centimetres (ninety minims), say about seven cubic centimetres (one hundred and fifteen minims). The glass is now covered with a filter paper and the solution is ready for inoculation. One cubic centimetre, or about sixteen minims, of this liquid is introduced into each patient; this is the first day's treatment.

When these six persons present themselves again on the second day, they will receive an injection from the solution of a cord which has remained only thirteen days in the desiccating bottle. On the third day of treatment, the twelve days' cord will be used; on the fourth day, the eleven days' cord; and so on until the third day cord in summer, or fourth or fifth day cord in winter shall have been used.

M. Pasteur first started his method of treatment, by the so-called "Simple treatment," which, as we have just now described, consisted in making one daily injection, beginning by the fourteen days' cord, and finishing by the first day one. As a type of this treatment, we have the history of the treatment of his first patient, the young shepherd, Joseph Meister, who was bitten on July 4, 1885, by an hydrophobic dog, on the hand, legs and thighs; he received fourteen wounds. Professors Vulpian and Grancher, having been called in by M. Pasteur, expressed their opinion that according to the severity, seat, and number of his wounds, this young boy was almost certainly condemned to be taken with the disease and die. M. Pasteur, after having narrated the results of his researches to the above named professors, was encouraged by them to use the inoculations, which from that day were made by Prof. Grancher—M. Pasteur not being a physician.

This young man was bitten on July 4th, at 8 A.M., and his treatment was begun only on July 6th, at 8 P.M. The whole treatment of the case was as follows:

On July 6th, 8 P.M., $\frac{1}{2}$ c. cm. (8 minims) of the 15 days' cord.

"	7th, 9 A.M., $\frac{1}{2}$ "	"	"	"	14 "
"	7th, 6 P.M., $\frac{1}{2}$ "	"	"	"	12 "
"	8th, 9 A.M., $\frac{1}{2}$ "	"	"	"	11 "
"	8th, 6 P.M., $\frac{1}{2}$ "	"	"	"	9 "
"	9th, 11 A.M., $\frac{1}{2}$ "	"	"	"	8 "
"	10th, 11 A.M., $\frac{1}{2}$ "	"	"	"	7 "

On July 11th, 11 A.M., $\frac{1}{2}$ c. cm. (8 minims) of the	6 days' cord.
" 12th, 11 A.M., $\frac{1}{2}$ " " " "	5 "
" 13th, 11 A.M., $\frac{1}{2}$ " " " "	4 "
" 14th, 11 A.M., $\frac{1}{2}$ " " " "	3 "
" 15th, 11 A.M., $\frac{1}{2}$ " " " "	2 "
" 16th, 11 A.M., $\frac{1}{2}$ " " " "	1 day cord.

This young man is doing well to-day, and the inoculations have not given him the disease, although the same solutions used on him of the 6th, 5th, 4th, 3d, 2d, and 1st days, have invariably given hydrophobia to the rabbits to which they were injected; the 1st and 2d day cords, produced the disease in rabbits on the seventh day; the 3d and 5th day cords produced it on the eighth, and the 6th day cord on the fifteenth day.

To-day M. Pasteur has entirely given up the so-called "simple treatment," and resorts exclusively to the "intensive treatment," in which the cords of one and two days are no more used, M. Pasteur having found that the 3d day cord in summer, and the 4th and even the 5th day cord in winter, had the same strength as the one day cord. The intensity of the treatment is in accordance with the severity of the bites, the treatment being more severe for bites of the exposed regions, face, head, and hands, and much less so for bites of parts protected by clothes. The description of the intensive method, as given by M. Pasteur in his communication to the Académie des Sciences, in October, 1886, was as follows:

"On the first day of treatment, for persons bitten on the face or head, the cords of twelve, ten, and eight days will be inoculated successively at 11 A.M., 4 P.M., and 9 P.M. On the second day, the cords of six, four, and two days at the same hours; and on the third day, the first day cord. The series is then taken up again on the fourth day, the cords of eight, six, and four days; on the fifth day, the cords of three and two days; on the sixth day, the one day cord; on the seventh, a cord of four days; on the eighth, a cord of three days; on the ninth, a cord of two days; on the tenth, a one day cord." This treatment, in three series, is done in a period of ten days.

The inoculations are performed at the Institute Pasteur exclusively; every one who desires to undergo the treatment must come to the Institute.

For nearly two years the inoculations were made by Prof. Grancher, of the Paris Faculty of Medicine; while he still superintends this service, the inoculations are now performed by Dr. Chantemesse and Dr. Charin.

On the physician's table very few instruments are to be found; a series of hypodermatic syringes which, needless to say, have been previously well sterilized, then a flask of hot water, kept continuously at the boiling temperature, and containing suspended in it a test tube filled with oil; this hot oil is for the purpose of dipping into it the hypodermatic needle, immediately before each inoculation, to sterilize it perfectly. On the same table we find a vase containing a solution of an antiseptic, carbolic acid usually, which is for the purpose of washing the parts before the injection is made.

The injections are made into the abdominal wall, right and left hypochondriac regions alternately, to prevent too great irritation of the injected parts. Sometimes local inflammation is produced, slight swelling and redness are observed; the patient is immediately ordered to take a full hot water bath, which in the great majority of cases will remove this slight annoyance.

The patients are divided into a certain number of sec-

tions, according to the number of days they have been under treatment. The physician always begins to inoculate first those who present themselves for the first time, and who, therefore, receive the weakest virus; and always ends by those who receive the most powerful virus. The reason for this lies in the fact that, by injecting the weaker virus first, there is no danger for the next series of patients, if some of this virus should remain by mistake in the hypodermic syringe; while, on the contrary, if the inoculations were begun by the stronger virus, there would be danger for the next series, who would not be ready for the strong virus in case some of it remained in the syringe.

The solution of virus is contained in a corresponding number of glasses, as there are different cords to be inoculated, and each one is covered and closed by filter paper; the syringe is filled by passing the needle through the filter paper, which precaution prevents the virus from being contaminated by impurities of the atmosphere. The quantity of virus injected is one and a half cubic centimetres, or twenty-three minims, at each inoculation made with the weaker virus; but only one cubic centimetre, or fifteen minims, of the stronger virus is injected at one time.

Before closing, let me refer to the experimental test, that exists to assure us that a person will not die from the effects of inoculations, as has often been proclaimed against the method.

If the fragment of a cord, obtained from a dead hydrophobic rabbit, from the same that will be used to prepare the human virus, is inoculated to a healthy rabbit, this animal will present symptoms of the disease on the seventh day, and die on the tenth.

If, instead of inoculating this fragment of cord in a rabbit, it is inoculated in a dog; this dog will present the first signs of the disease, not on the seventh day, but on the twelfth day, and die shortly afterward.

The test lies in the following experiment: If a fragment of the cord of this dead dog is inoculated anew in a rabbit, this animal will take the disease on the seventh day and die on the tenth; showing that the rabbit virus has really been the cause of death in the dog; while if the rabbit had been inoculated with the cord of a dog which died from the ordinary street hydrophobia, he would only have shown signs of the disease on the fifteenth day.

This test has been applied to every dead person who had been inoculated, and has never shown that any of them had died from the result of rabbit hydrophobia.

ARTHUR V. HUGENSCHMIEDT, M.D.

NEWS ITEMS.

OFFICIAL LIST OF CHANGES IN THE STATIONS AND DUTIES OF OFFICERS SERVING IN THE MEDICAL DEPARTMENT, U. S. ARMY, FROM FEBRUARY 26 TO MARCH 4, 1889.

By direction of the Secretary of War, WILLIAM O. OWEN, JR., *Captain and Assistant Surgeon*, is relieved from duty at Fort Leavenworth, Kansas, and will report in person to the commanding officer Fort Gibson, Indian Territory, for duty at that post, relieving Captain and Assistant Surgeon C. N. B. Macauley, who, on being so relieved, will report in person to the commanding officer Fort Leavenworth, Kansas, for duty at that post.—Par. 3, S. O. 48, A. G. O., February 27, 1889.